

Mississippi River
Whole Body Contact Recreation
Use Attainability Analysis

July 2005

Prepared for:
METROPOLITAN ST. LOUIS SEWER DISTRICT
2350 Market Street
St. Louis, Missouri 63103

Prepared by:
MEC WATER RESOURCES, INC.
1000 North College Avenue, Suite 4
Columbia, Missouri 65201

TABLE OF CONTENTS

I. INTRODUCTION	1
II. STUDY AREA	2
III. DATA COLLECTION	11
IV. WHOLE BODY CONTACT RECREATION USE CONSIDERATIONS	11
A. Existing Use Considerations	11
B. Attainability of Whole Body Contact Recreation	17
V. CONCLUSIONS AND RECOMMENDATIONS	24
VI. REFERENCES	25

LIST OF APPENDICES

Appendix A	Use Attainability Analysis Forms and Site Photographs
Appendix B	Bacteria Data
Appendix C	Hydrologic and Hydraulic Data
Appendix D	Recreational Use Survey Forms
Appendix E	Barge Traffic Data

LIST OF FIGURES

Figure 1	Study Area Map
Figure 1-1	Study Area Map – Alton (IL) Quad
Figure 1-2	Study Area Map – Columbia Bottoms Quad
Figure 1-3	Study Area Map – Wood River (IL) Quad
Figure 1-4	Study Area Map – Granite City (IL) Quad
Figure 1-5	Study Area Map – Webster Grove Quad
Figure 1-6	Study Area Map – Chahokia (IL) Quad
Figure 1-7	Study Area Map – Oakville Quad
Figure 2	Recreation Season Fecal Coliform Geometric Means for Mississippi River near Alton and Grafton, IL (1975 - 2004)
Figure 3	Recreation Season E. coli Geometric Means for Mississippi River near Alton and Grafton, IL (1998 - 2004)
Figure 4	Recreation Season Fecal Coliform Geometric Means for Mississippi River at Thebes, IL (1975 – 2004)

LIST OF FIGURES (Continued)

- | | |
|-----------|--|
| Figure 5 | Recreational Season E. coli Geometric Means for Mississippi River at Thebes, IL (1998 - 2004) |
| Figure 6 | Mississippi River Ports, Docks, and Terminals in the St. Louis Vicinity |
| Figure 7 | Average Mississippi River Vessel Passages in St. Louis, Missouri Metropolitan Area (1995-1999) |
| Figure 8 | Aerial Photo of Mississippi River Barge Traffic Near St. Louis, June 21, 2003 |
| Figure 9 | Flow and Mean Velocity Rating Curve USGS 07010000 Mississippi River at St. Louis (1980-2005) |
| Figure 10 | Flow Duration Curve Mississippi River at St. Louis (1980-2005) |
| Figure 11 | Mean Channel Velocity Duration Curve USGS 07010000 Mississippi River at St. Louis (1980-2005) |

I. INTRODUCTION

In September 2000, U.S. Environmental Protection Agency Region VII (EPA) notified the Missouri Department of Natural Resources (MDNR) that several items contained within Missouri's Water Quality Standards were inconsistent with the intent of the Federal Clean Water Act of 1972 (CWA). EPA noted that MDNR's limited designation of streams for swimming uses was inconsistent with the CWA. Section 101(a)(2) of the CWA establishes as a national goal of "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water," wherever attainable. This goal presumes that all waters should be suitable for fishing and swimming unless attainment of these uses is not feasible per Title 40 Code of Federal Regulations (CFR) Section 131.10. The MDNR currently designates only 10% of Missouri's classified waters as having Whole Body Contact Recreation (WBCR) uses (swimming).

In response to concerns raised by EPA, MDNR is proposing WBCR use designation of all classified waters listed in State regulations. However as allowed by Federal regulations, a Use Attainability Analysis (UAA) may be conducted to determine if WBCR use is an appropriate and attainable use for a specific waterbody.

A UAA is a structured scientific assessment of the factors affecting use attainment, which may include physical, chemical, biological, and economic factors. If a designated use is not an existing use attained on or after November 28, 1975, one of the following attainability factors may be used to justify the removal or downgrading of a designated use (from 40 CFR 131.10(g)):

- (1) Naturally occurring pollutant concentrations prevent the attainment of the use;
- (2) Natural, ephemeral, intermittent, or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for with sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met;
- (3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place;
- (4) Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the waterbody to its original condition or to operate such modifications in a way that would result in the attainment of the use;
- (5) Physical conditions related to the natural features of the water body, such as lack of proper substrate, cover, flow, depth, pools, riffles, and the like unrelated to water quality, preclude attainment of aquatic life protection uses; or
- (6) Controls more stringent than those required by Title III Sections 301 and 306 of the CWA would result in substantial and widespread economic and social impact.

MDNR, in cooperation with State, Federal, Municipal, and private entities, developed a recreational UAA protocol for Missouri waters (MDNR 2004). This recreational UAA framework addresses use attainability factors that may allow removal or downgrading of WBCR uses for specified waters. Missouri WBCR UAAs may include, but are not limited to: field observations of swimming areas, sampling for pathogenic indicator bacteria, and interviews to determine historic recreational use.

The Metropolitan St. Louis Sewer District is interested in determining whether or not WBCR is an existing or attainable use for the Mississippi River segment within the vicinity of St. Louis. MSD is concerned about potentially expending excessive public financial resources in pursuit of a WBCR goal if it is not attainable. Ongoing wastewater treatment and Combined Sewer Overflow (CSO) control should be founded on realistic and achievable goals for area receiving waters. To address these concerns, Mississippi River data were collected and evaluated to gain an understanding of existing, potential, and attainable WBCR uses.

II. STUDY AREA

The study segment for this project includes the Mississippi River segment from the Melvin Price Locks and Dam at Alton, Illinois to the confluence of the Meramec River, constituting the Mississippi River segment adjacent to the majority of the St. Louis, Missouri metropolitan area (Figure 1). Study area maps are also provided at 1:24,000 scale as Figures 1-1 through 1-7. The Mississippi River is a Class P Water of the State throughout Missouri and is divided into three classified segments, totaling 490 stream miles (Blunt 2004). The upstream classified segment originates at the Des Moines River confluence and terminates at the Missouri River confluence (Missouri waterbody identification number 0001). The two downstream segments are divided at the Ohio River confluence (upstream and downstream Missouri waterbody identification numbers 1707 and 3142, respectively). Beneficial uses currently designated within all segments include: Protection of Warm-Water Aquatic Life, Livestock and Wildlife Watering, Drinking Water Supply, and Human Health Protection (Fish Consumption and Secondary Contact Recreation). The middle (Missouri waterbody 1707) and southern (Missouri waterbody 3142) segments are also designated for Irrigation. The northern segment (Missouri waterbody 0001) is also currently designated for WBCR use.

Public access to the Mississippi River near the St. Louis, Missouri metropolitan area is essentially limited to the Missouri Department of Conservation (MDC) North Riverfront Park Access at I-270 and at the Gateway Arch Riverfront (Figure 1). Watercraft may also access this area from the Missouri River using the MDC Columbia Bottom Conservation Area boat ramp. Photographs and recreational use surveys of these access points are included as Appendix A. MDNR Data Sheets A and B are also provided in Appendix A.



Figure 1

Study Area Map



Rivers



Accesses



Locks and Dams



Note: Figures 1-1 through 1-7, depicting 1/24k scale, immediately follow this Figure



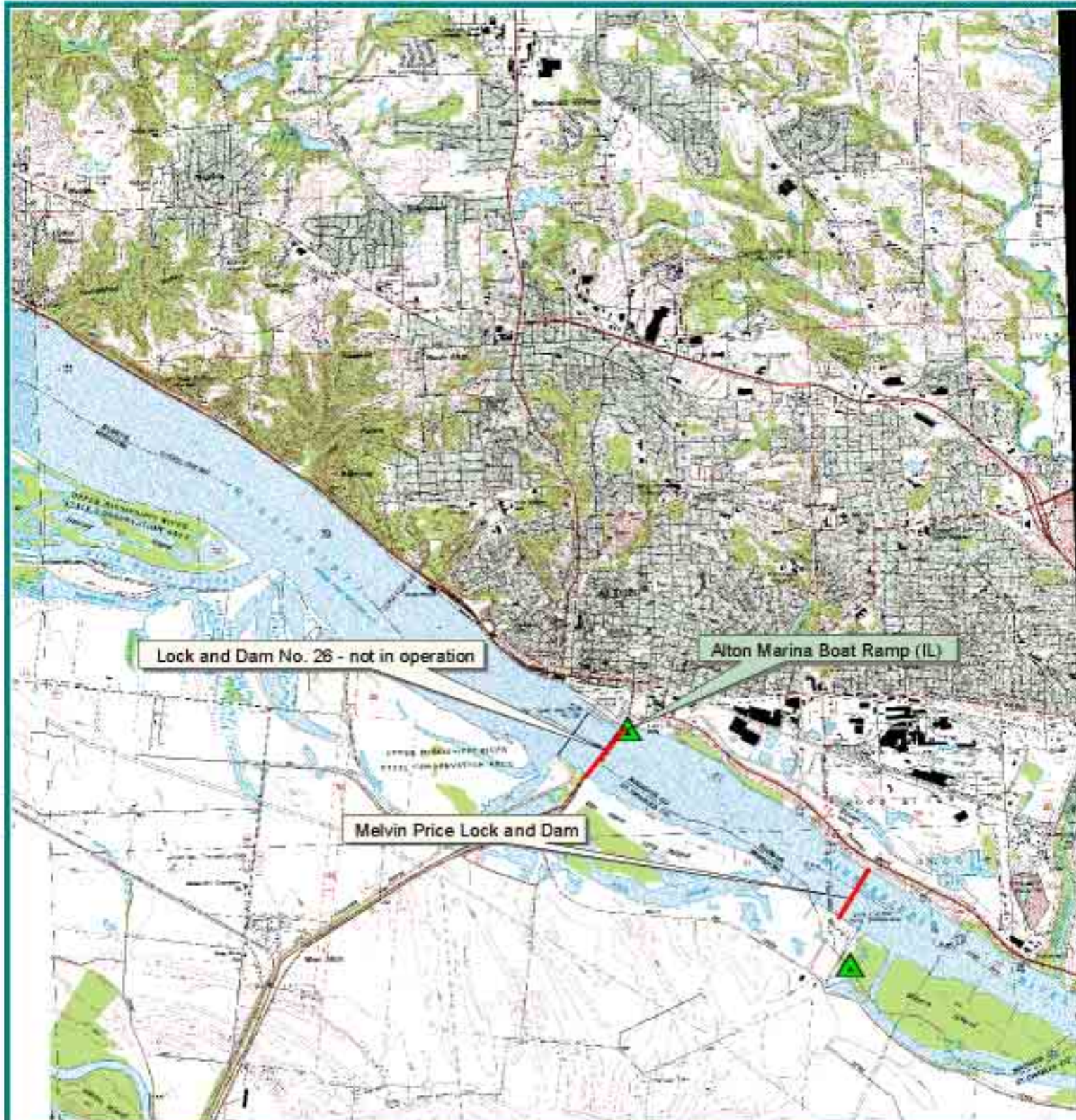


Figure 1-1

Study Area Map
Alton (IL) Quad



Accesses



Locks and Dams

0.4 0.4 0.8 Miles

A scale bar with markings for 0.4, 0.4, and 0.8 miles.

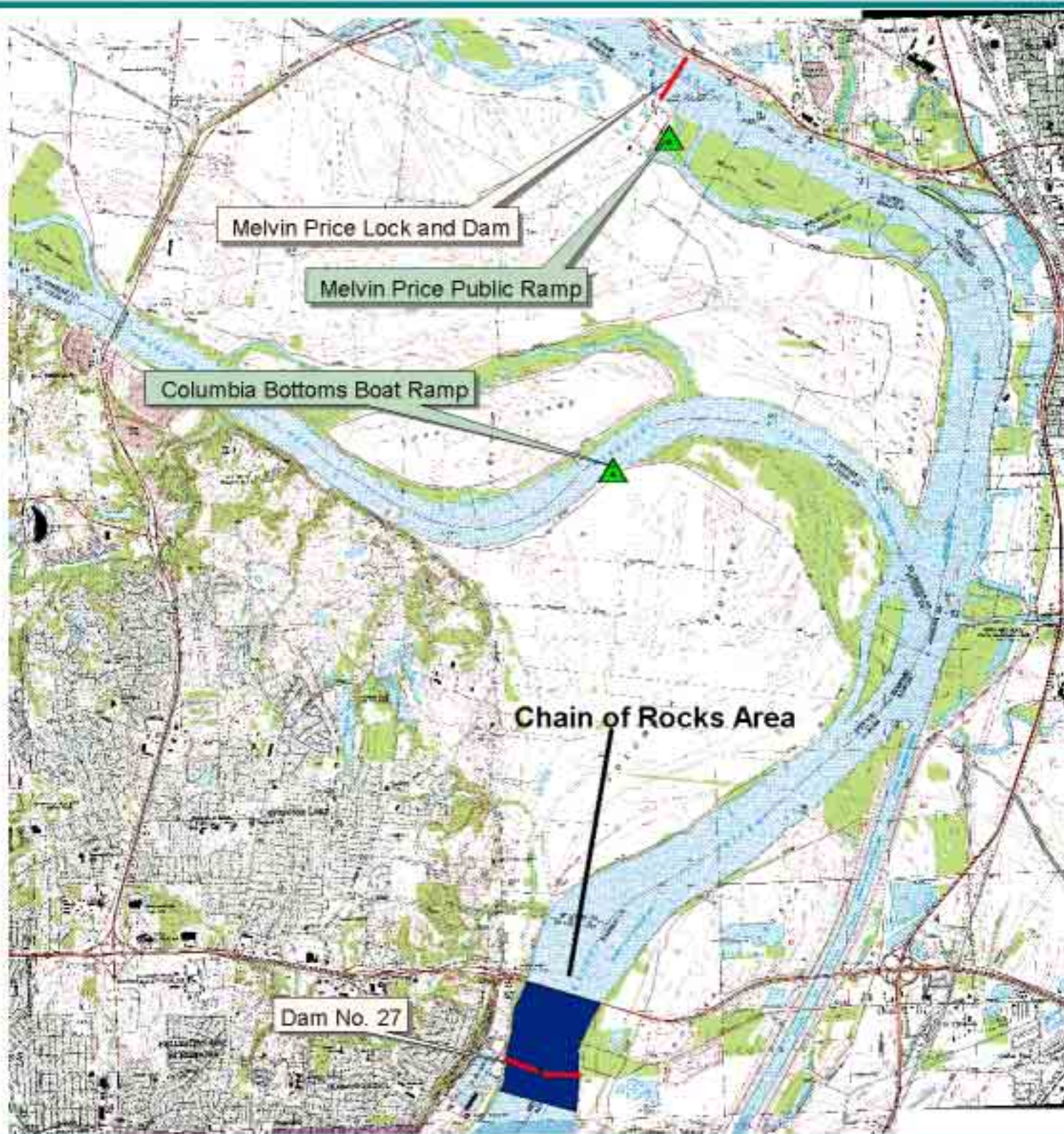


Figure 1-2

Study Area Map
Columbia Bottoms Quad

- Chain of Rocks Area
- Accesses
- Locks and Dams



0.4 0 0.4 0.8 Miles

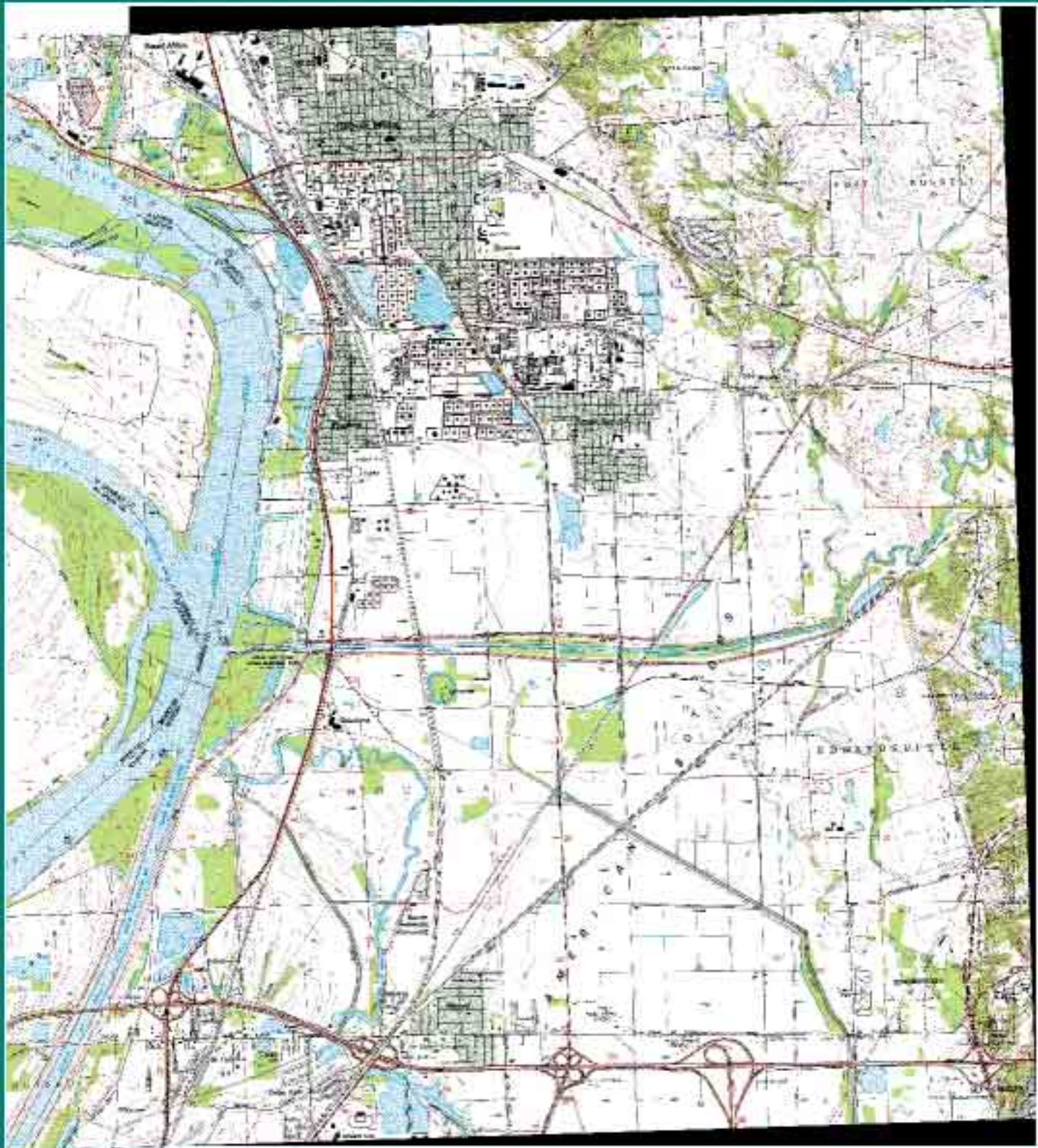





Figure 1-3

Study Area Map
Wood River (IL) Quad



-  Accesses
-  Locks and Dams

0.5 0 0.5 1 Miles



**MEC Water
Resources** 
The Science of Water Quality

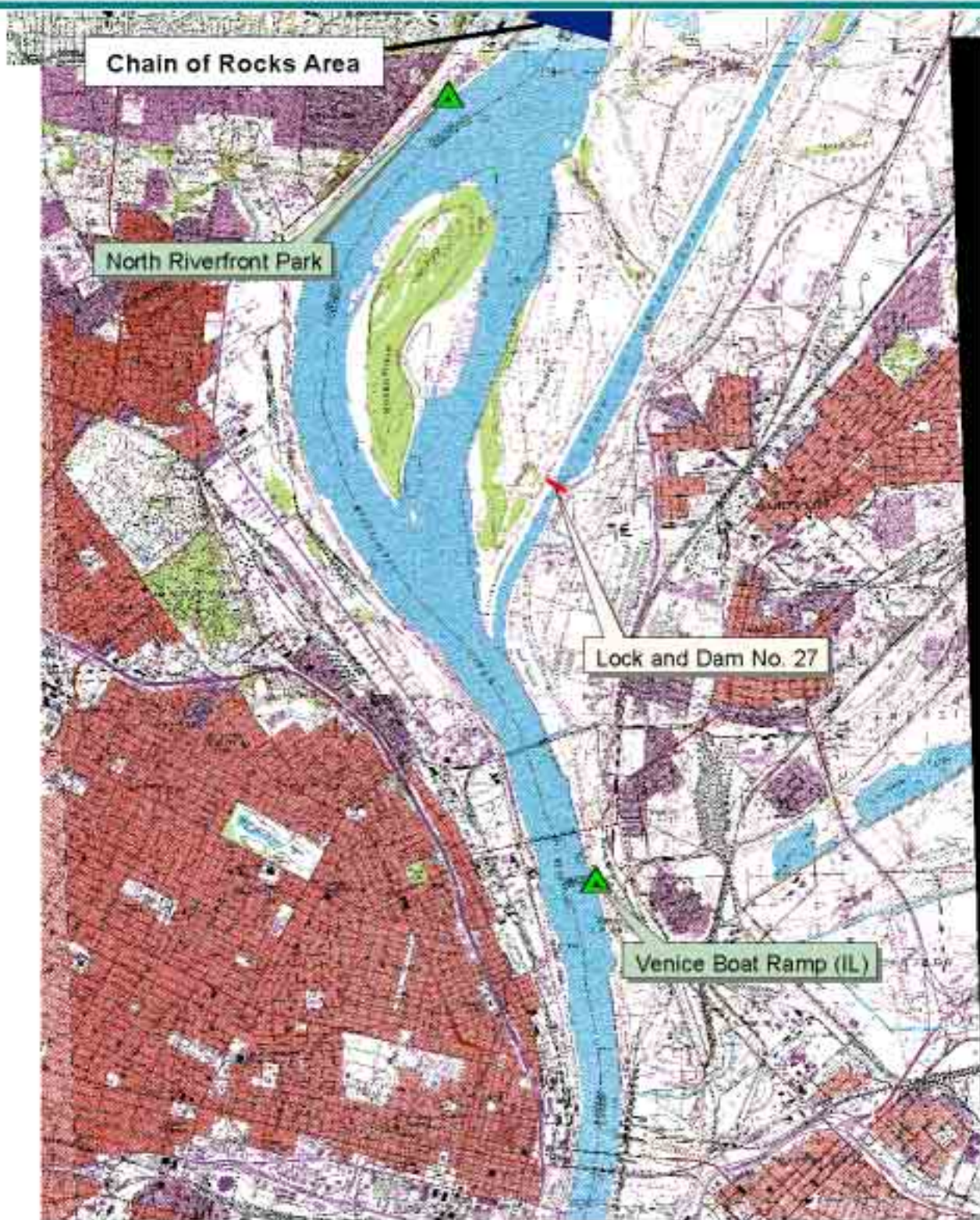


Figure 1-4

Study Area Map
Granite City (IL) Quad



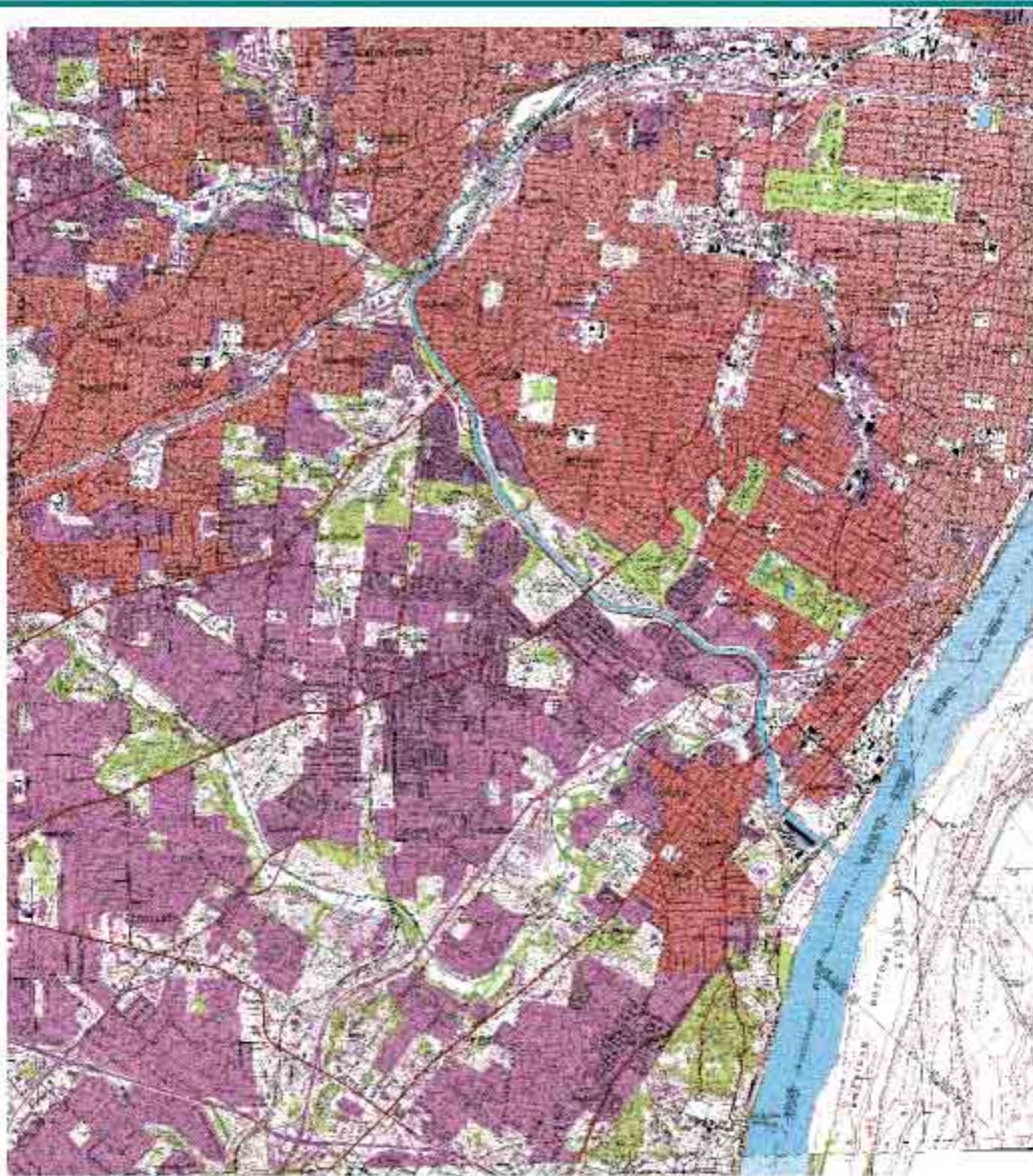


Figure 1-5

Study Area Map
Webster Groves Quad



Accesses



Locks and Dams

0.5 0 0.5 1 Miles

**MEC Water
Resources**
The Science of Water Quality



Figure 1-6

Study Area Map
Cahokia (IL) Quad



Accesses



Locks and Dams

0.5 0 0.5 1 Miles

**MEC Water
Resources**
The Science of Water Quality

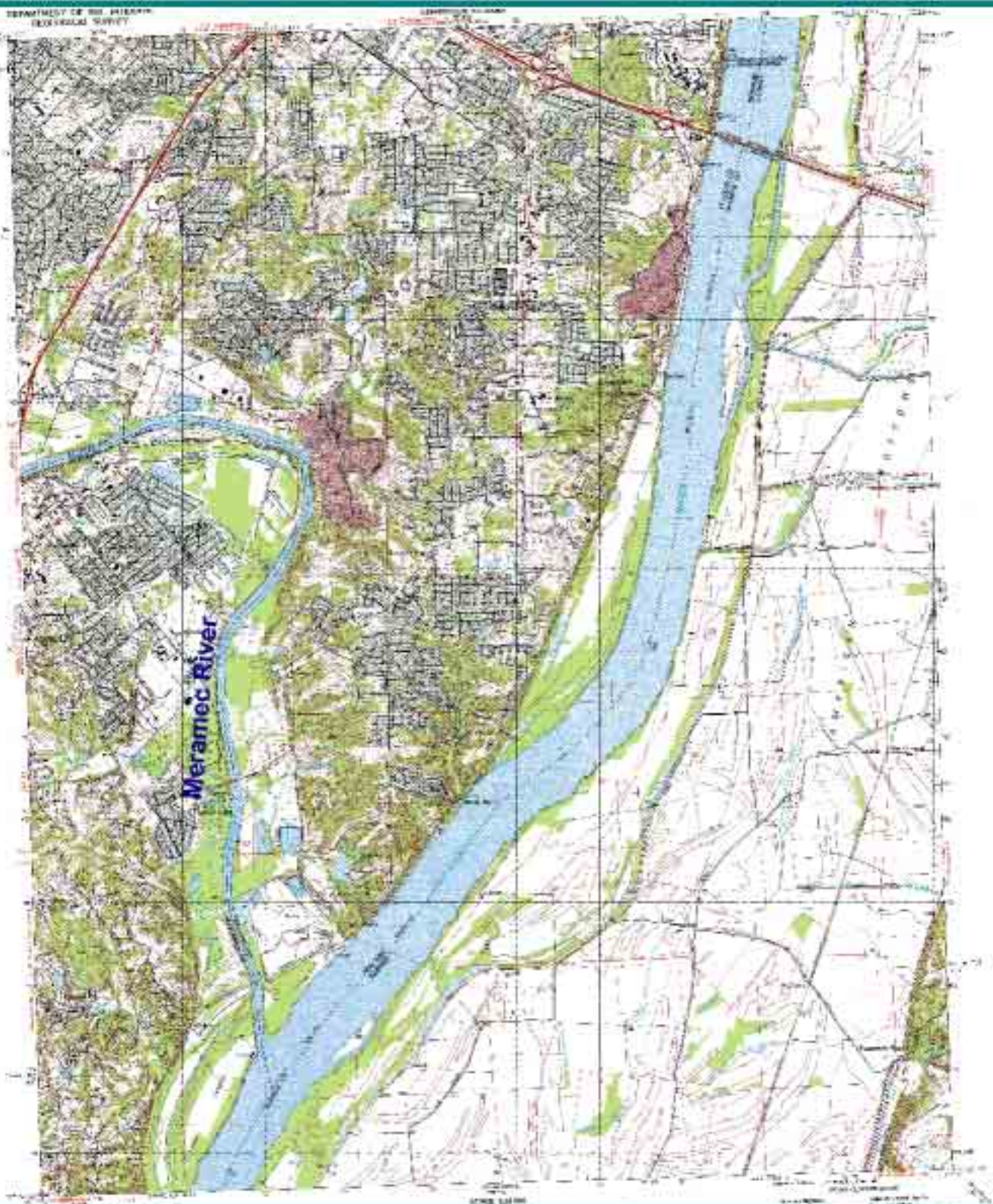




Figure 1-7

Study Area Map
Oakville Quad



-  Accesses
-  Locks and Dams

0.5 0 0.5 1 Miles



III. DATA COLLECTION

Various types of data and information were collected to support this analysis of use attainability. Hydrologic, hydraulic, and water quality data were collected by the United States Geologic Survey (USGS) at several locations within and downstream of the study segment. Fecal coliform and *E. coli* bacteria data were collected by USGS at the following monitoring stations: Mississippi River at Thebes, IL (Station 07022000), Mississippi River at Grafton, IL (Station 05587450), and Mississippi River at Alton, IL (Station 05587540) and are presented in Appendix B. Bacteriological data are presented in tabular form, but not on MDNR Data Sheet C format (MDNR 2004). These datasets span different periods from 1973 through 2004 and represent the most extensive and spatially proximate bacteria datasets available for the Mississippi River. Long-term hydrologic and hydraulic data are also available for the Mississippi River at St. Louis (Station 07010000). Hydrologic and hydraulic data used to support this report one included in Appendix C.

Recreational use interviews were conducted with various Federal, State, and private organizations to assess the types and frequencies of recreational uses within the study segment. Individuals were asked if they personally used the water, witnessed someone using the specific waterway or heard of individuals utilizing the study river segment. Interview records are provided within Appendix D.

Barge traffic data were available from US Army Corps of Engineers (USCOE) and the Midwest Area River Coalition 2000 (MARC 2000). The USCOE Lock Performance Monitoring System (LPMS) encompasses the collection, editing, maintenance and analysis of barge data from all USCOE-owned and operated locks. These data provide an overview of the traffic and operation at each lock. Barge traffic data are provided in Appendix E.

IV. WHOLE BODY CONTACT RECREATION USE CONSIDERATIONS

A designated use may only be downgraded or removed if this use is not an existing use and is considered unattainable. Therefore, the UAA process must include consideration of both existing uses and attainability of potential uses. The following sections include existing use and use attainability considerations that provide the basis for the WBCR use recommendations.

A. Existing Use Considerations

Provisions contained within the CWA prohibit removal of an existing use that was attained on or after November 28, 1975. Use attainment is measured by assessing compliance with applicable water quality standards (beneficial uses and water quality criteria). In the case of recreational contact uses (swimming, etc.), existing use considerations should be based upon attainment of both:

- € The Beneficial Use, i.e. historic use of the waterbody in question for swimming, water skiing, skin diving, etc.; and
- € The Water Quality Criteria that support the beneficial use, i.e. historic (post 11/28/75) and current levels of pathogen indicator bacteria.

In summary, a recreational use is attained and existing when the waterbody is used for a specified recreational activity and is concurrently supported by levels of water quality adequate for the specific use.

1. Beneficial Use Evaluation

According to information provided during interviews with various Federal, State and private organizations, the type and frequency of WBCR use varies appreciably within the study segment. Four State and Federal representatives and two representatives of private organizations were interviewed. Efforts were made to interview the Missouri Whitewater Association; however, no responses were received following interview requests. The National Park Service was also contacted to provide recreational use information at the Jefferson National Expansion Memorial Park (Arch); however, representatives declined interview requests.

a. Mississippi River - Upstream of Lock and Dam #26

Several individuals interviewed noted frequent whole body contact uses (swimming, water skiing and jet skiing) within Mississippi River segments upstream of the Melvin Price Locks and Dam (L/D 26) at Alton, Illinois (Figure 1). This navigation structure provides relatively calm upstream water conditions, conducive to various recreational uses. These uses were presumably the reason for previous whole body contact recreational use designation within the upstream classified Mississippi River segment (Missouri waterbody 0001). Two interviewed individuals with MVS Barefoot, a barefoot water skiing training and competition organization, indicated that they personally use this area for waterskiing several times per week.

b. Mississippi River - Between Lock and Dam #26 and MDC North Riverfront Park Access

Whole body contact recreation use diminishes significantly below the Melvin Price Locks and Dam as indicated by recreational surveys. Surveys indicate kayaking is the predominant recreational use downstream of the Melvin Price Locks and Dam. The principal kayaking attraction within this area is the Chain of Rocks, immediately downstream of I-270 (Figure 1-2). The Chain of Rocks Canal (Lock 27) allows barge traffic to bypass the hazardous Chain of Rocks reach, creating an area that experienced kayakers may use without interference from barges. Two locations near Mosenthein Island also draw kayakers. Kayakers likely access these areas from the MDC North Riverfront Park Access (which requires upstream paddling), the MDC Columbia Bottom Conservation Area, or the I-270 right-of-way. The Alpine Shop, Kirkwood, Missouri, offers advanced kayaking training at the Chain of Rocks three to five times per year in late summer and early fall. An instructor for these classes was contacted and provided a description of class offerings; however, he respectfully declined to provide a formal interview. This training course has a maximum of 12 students and is offered twice per day. Class participants access the Mississippi from the MDC Columbia Bottoms Conservation Area and take out at the MDC North Riverfront Park Access. Kayaking activities are not specifically included in proposed recreational use definitions or addressed in Missouri UAA guidance documents. The frequency of rolling maneuvers, resulting in whole body submersion, varies by experience level of the kayaker and local water conditions. Submersion frequency and duration during kayaking are expected to be less than during swimming exposures, which were the basis of epidemiological studies used for water quality criteria development (Dufour

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

et al. 1986). Therefore, MDNR must decide the applicability of kayaking recreational use to WBCR use.

c. Mississippi River - MDC North Riverfront Park Access to Meramec River (Metropolitan St. Louis)

Whole body contact recreation is apparently very limited within the downtown and southern St. Louis, Missouri metropolitan area. The only WBCR use identified through interviews is a charity barefoot water skiing event (Arch Ski) on January 1 organized by MVS Barefoot. The duration of these events is relatively short due to cold temperatures. The Lake St. Louis Water Ski Club also conducted a photo shoot for a national water ski publication in front of the Arch once. One interviewee, familiar with downstream recreational uses, indicated that the nearest downstream segment with frequent WBCR use was at the Kaskaskia River confluence near St. Genevieve, Missouri.

Interviewees provided several reasons for limited recreational use within the St. Louis, Missouri metropolitan area. Safety concerns due to high currents and barge traffic were frequently listed as limiting recreational use. Interviewees also cited availability of alternate recreational waters, lack of access, and lack of quality sand bars that attract use were also cited.

2. Water Quality Criteria Evaluation

MDNR is proposing a tiered approach to recreational use classification. The proposed Category A of WBCR (WBCR-A) will include waters that have been established as public swimming areas allowing full and free access by the public for swimming purposes and waters with existing WBCR use. MDNR currently proposes this WBCR use category for waters that are currently designated for WBCR in Missouri's Water Quality Standards, such as the Mississippi River segment between the Des Moines River confluence and the Missouri River confluence (Missouri waterbody 0001). Water quality criteria assigned to the proposed WBCR-A use are fecal coliform and *E. coli* geometric means of 200 and 126 colonies per 100 mL, respectively. These criteria are based upon an illness risk of 8 illnesses per 1000 WBCR exposures. MDNR currently proposes classification of all other waters not designated for WBCR-A as Category B WBCR (WBCR-B) designated use, including the Mississippi River segments downstream of the Missouri River confluence. The water quality criterion assigned to WBCR-B is an *E. coli* geometric mean of 548 colonies /100 mL, based upon an illness risk of 14 illnesses per 1000 WBCR exposures.

Recreational season bacterial geometric means of observed data were calculated from the USGS stations at Thebes, Illinois (07022000), at Grafton, Illinois (05587450), below Grafton, Illinois (05587455) at Alton, Illinois (05587500), and below Alton, Illinois (05587550). The Alton and Grafton, Illinois data were pooled to represent upstream water quality conditions since USGS sampling locations moved from Alton to Grafton, Illinois from 1989 to 1993. MDNR has not provided detailed procedures to determine high flow exemptions from bacteria criteria. As a result, bacteria data were pooled and not separated by flow or stage.

Evaluation of actual use attainment with the available data is limited, as five samples were never taken within a thirty-day period. The ambient criteria document for bacteria published in 1986 (Dufour et al. 1986) and draft implementation guidance set forth in 2002 (Wigal 2002) indicate compliance with the geometric mean WBCR criteria should be measured from at least

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

five samples collected within a thirty day period during steady-state, dry weather conditions. However, comparison based on less frequent sampling is allowable where justified by State agencies.

Bacterial data collected upstream (Grafton and Alton, Illinois) and far downstream (Thebes, Illinois) of the study segment suggest that the applicable proposed water quality criteria were achieved in recent years. The proposed WBCR-A fecal coliform criterion was met 16 of 29 recreational seasons and completely since 1997 at the Alton and Grafton locations (Figure 2). The proposed WBCR-A *E. coli* criterion were met in all but one recreational season (1998) at Grafton location (Figure 3). The Grafton and Alton data probably do not reflect water quality conditions below the Missouri River, due to the significant bacterial input from the Missouri River.

Data compiled by recreation season indicate that the proposed WBCR-A fecal coliform criterion was not met in 29 of 30 seasons at the Thebes station since 1975 (Figure 4). In addition, the proposed WBCR-A *E. coli* criterion was not met in five of seven recreational seasons at the Thebes station (Figure 5). However, the proposed *E. coli* criterion to support the proposed WBCR-B designated use for downstream segments of the Mississippi River was achieved at Thebes for all available annual recreational season *E. coli* datasets. While these data suggest that the proposed WBCR-B designated use was attained at Thebes, water quality criteria attainment in the St. Louis, Missouri metropolitan area is inconclusive due to the distant location of the Thebes monitoring station (approximately 120 miles downstream of the St. Louis metropolitan area). MSD is currently contracting with USGS to collect water quality data within this segment, which will yield a better understanding of water quality conditions within this area in the future. Reevaluation of use attainment would also be required if the illness risk used to set WBCR-B criteria are modified.

Figure 2. Recreation Season Fecal Coliform Geometric Means for Mississippi River near Alton and Grafton, IL (1975 - 2004*)

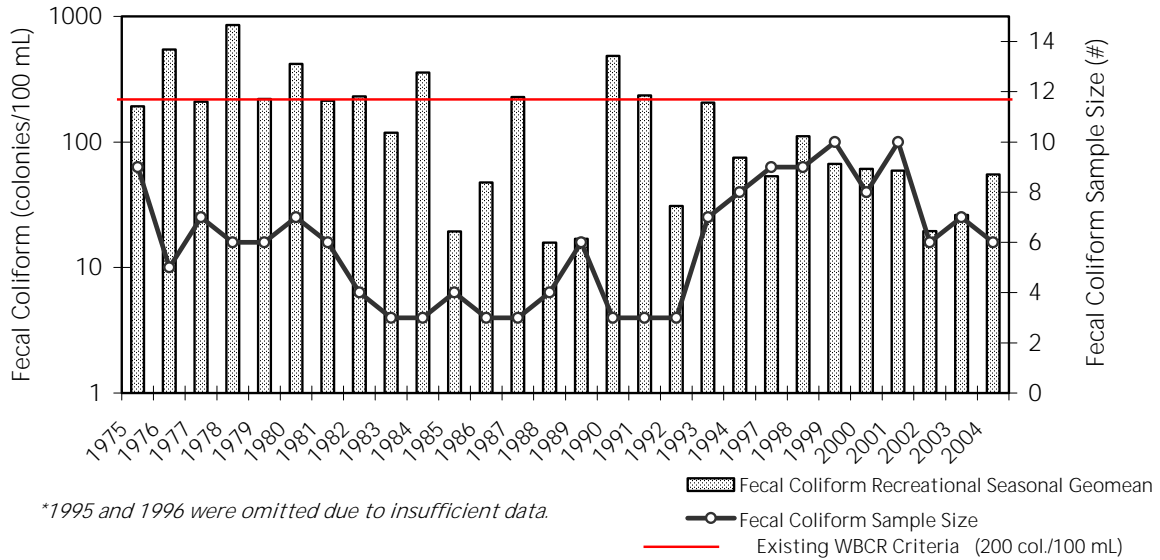


Figure 3. Recreation Season *E. coli* Geometric Means for Mississippi River near Alton and Grafton, IL (1998 - 2004)

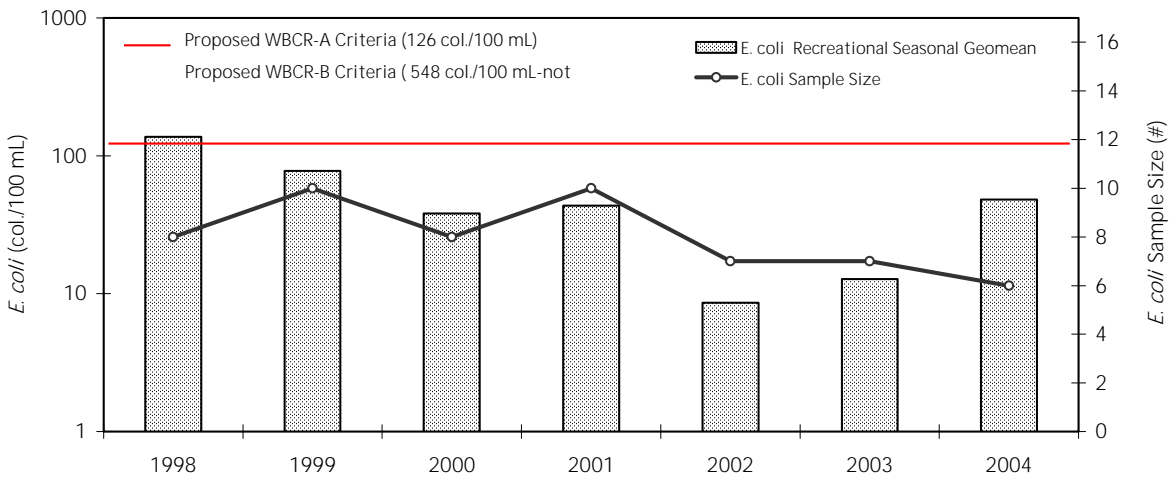


Figure 4. Recreation Season Fecal Coliform Geometric Means for Mississippi River at Thebes, IL (1975 - 2004)

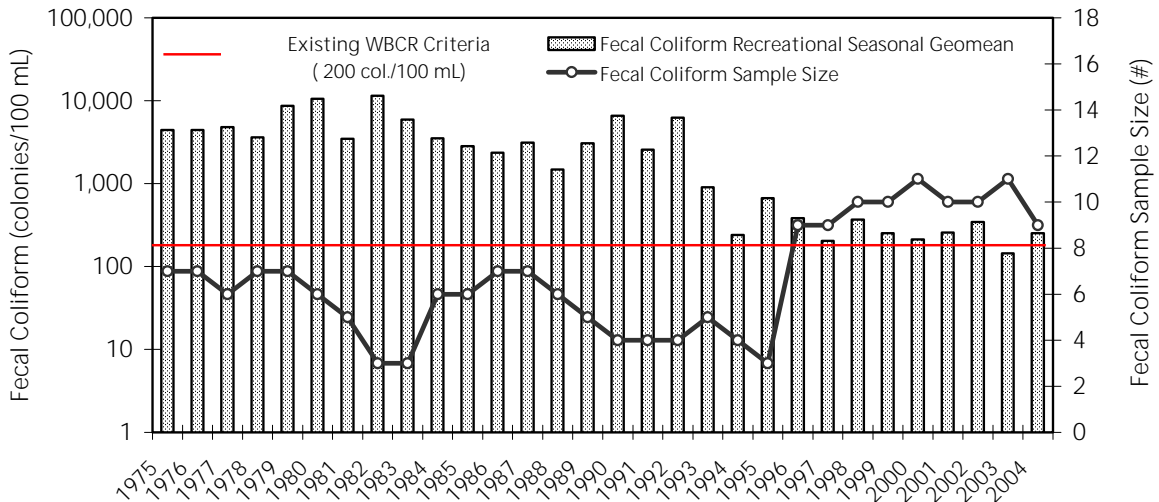
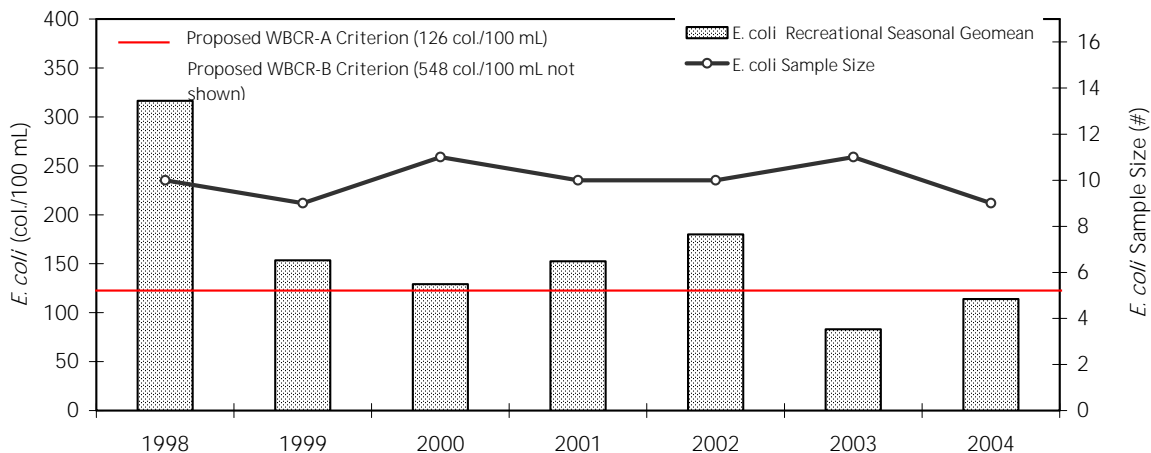


Figure 5. Recreational Season *E. coli* Geometric Means for Mississippi River at Thebes, IL (1998 - 2004)



3. Existing Use Conclusions

The presence of existing WBCR uses varies within the study segment. Frequent WBCR activities and attainment of water quality criteria suggest that WBCR use is existing within the Mississippi River segment upstream of the Melvin Price Locks and Dam.

Existing recreational uses cannot be conclusively determined between the Melvin Price Lock and Dam and upstream of the MDC North Riverfront Park Access as:

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

- € Recreational uses within this segment is apparently limited to kayaking, an activity yet to be defined in state guidance as primary or secondary contact recreation; and
- € Lack of ambient indicator bacteria data in this segment prevents use attainment evaluations.

Whole body contact recreation use should not be considered existing within the St. Louis metropolitan area downstream of the MDC North Riverfront Park Access and upstream of the Meramec River due to infrequent use. This river segment is limited in downstream extent to the Meramec River since recreational uses near this major tributary may not be adequately known. As previously discussed, the only known regular WBCR use within the St. Louis metropolitan area is the January 1 charity water skiing event, which is very infrequent, of short duration, and outside of the recreational season. The attainment of the proposed WBCR-B criterion is also unknown due to the lack of water quality data within this segment. MSD is currently contracting with USGS to collect water quality data within this segment, which will yield a better understanding of water quality conditions within this area in the future.

B. Attainability of Whole Body Contact Recreation

The CWA precludes the removal of existing or attainable uses. As presented above, WBCR use within the Mississippi River downstream of the MDC North Riverfront Park Access and upstream of the Meramec River should not be considered an existing use. For WBCR to be considered unattainable, one or more of six conditions described in 40 CFR 131.10(g) and MNDR UAA protocols must be satisfied. Multiple use attainability factors outlined in Federal regulations may apply to the Mississippi River within the St. Louis, Missouri metropolitan area. At this time, however, WBCR use recommendations are limited to the Mississippi River segment between the MDC North Riverfront Park Access and the Meramec River. Use attainability factors for this river segment may include, but not be limited to: use attainment prevented by hydrologic modifications (Factor 4) and substantial and widespread economic and social impacts (Factor 6).

1. Hydrologic Modifications Prevent Use Attainment

Substantial hydrologic modifications have occurred within the study segment to allow barge traffic on the Mississippi River. There are approximately 180 manufacturing facilities, terminals and docks in Missouri that ship and receive barge cargo, many of which are located within the study segment. The Port of Metropolitan St. Louis, defined as 71 miles of the Mississippi River, includes numerous facilities on both sides of the Mississippi River (Figure 6). St. Louis is considered the second busiest inland port in the United States.

The high volume of Mississippi River barge traffic within the St. Louis metropolitan area creates dangerous conditions for most WBCR uses. Figure 7 depicts the number of barge-towing vessels passing the St. Louis area along the Mississippi River from 1995 to 1999. Approximately 10,000 vessels towing 75,000 barges pass through the St. Louis metropolitan area on the Mississippi River each year (USCOE 2004). Aerial photography illustrates the presence of numerous barges within the study segment (Figure 8).

The hydrologic modifications (channelization) of the Mississippi River produce high velocities that may prevent attainment of swimming uses. According to Hyra (1978), optimal water velocities for swimming range from 0.25 to 0.75 feet per second (fps) while those exceeding

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

2 fps are considered marginal and unsafe at greater than 3 fps. The relationship between flow and mean channel velocity is depicted as Figure 9. Unsafe swimming conditions are exceeded approximately 85% of the time and correspond to flows above approximately 105,000 cubic feet per second (Figures 10 and 11). Marginal swimming conditions based on velocity boundaries are exceeded throughout the range of observed flows at the Mississippi River St. Louis gage. The velocity data presented depict mean channel velocity; therefore, lower velocities are present near shore or downstream of channel controls (training structures). However, swimming uses in these areas are likely limited due to lack of access and presence of high channel velocities adjacent to these areas.

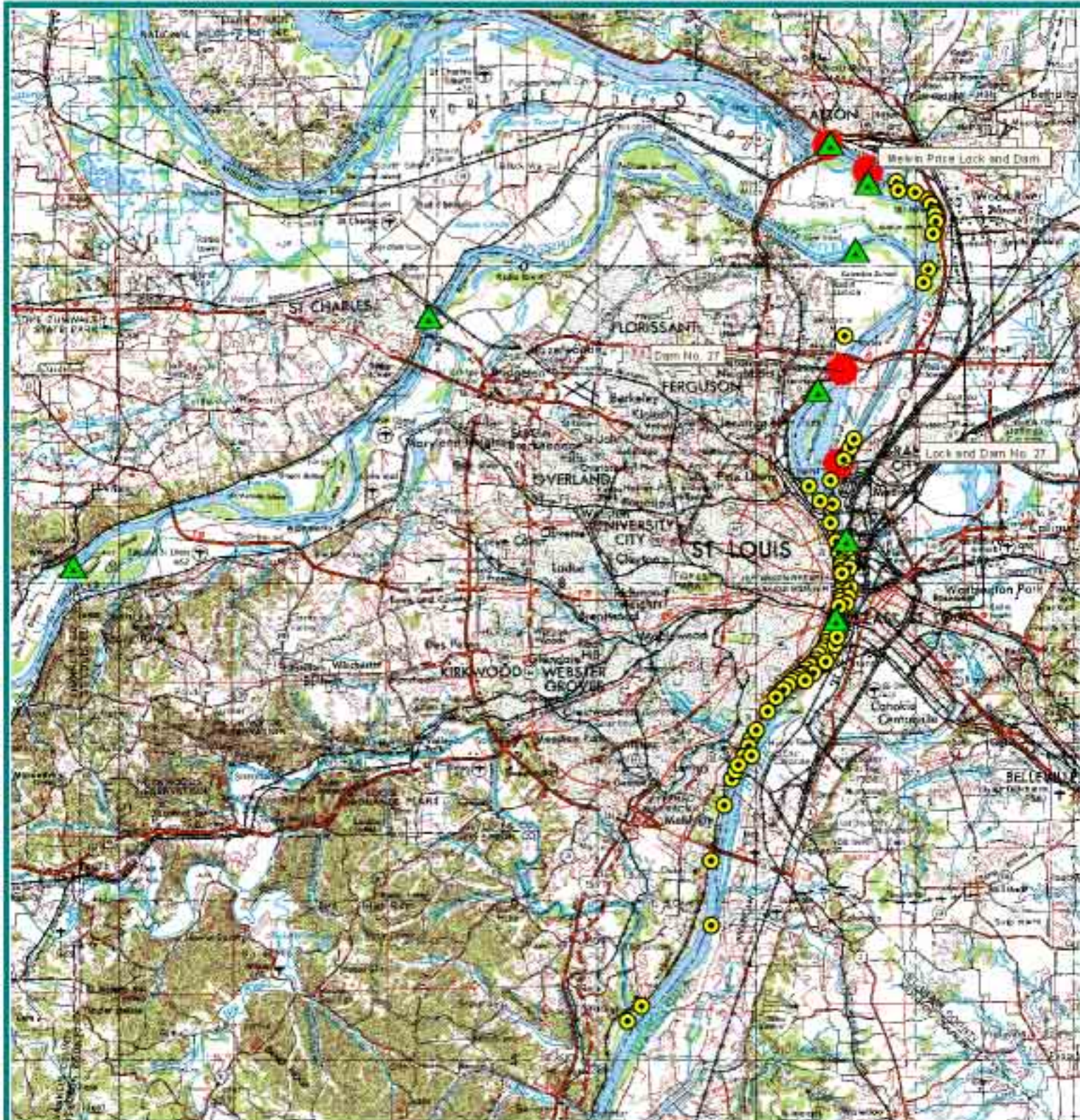


Figure 6

Mississippi River
Ports, Docks, and Terminals
in the St. Louis Vicinity



5 0 5 Miles



Accesses



Locks and Dams



Ports, Docks,
and Terminals

**MEC Water
Resources**
The Science of Water Quality

Figure 7: Average Mississippi River Vessel Passages in St. Louis, Missouri Metropolitan Area (1995-1999)

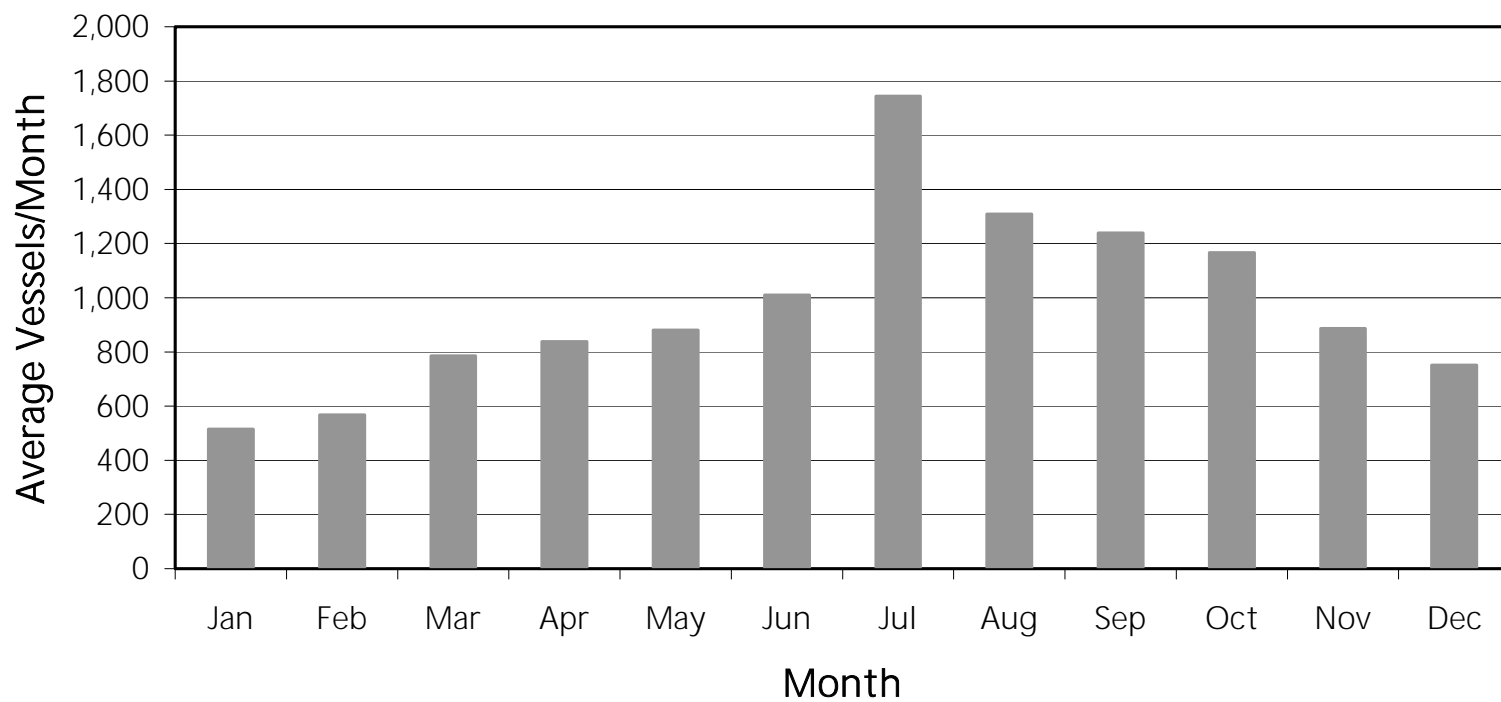




Figure 8

1 0 1 Miles

Aerial Photo of Mississippi
River Barge Traffic Near
St. Louis, June 21, 2003

Figure 9. Flow and Mean Velocity Rating Curve
USGS 07010000 Mississippi River at St. Louis (1980-2005)

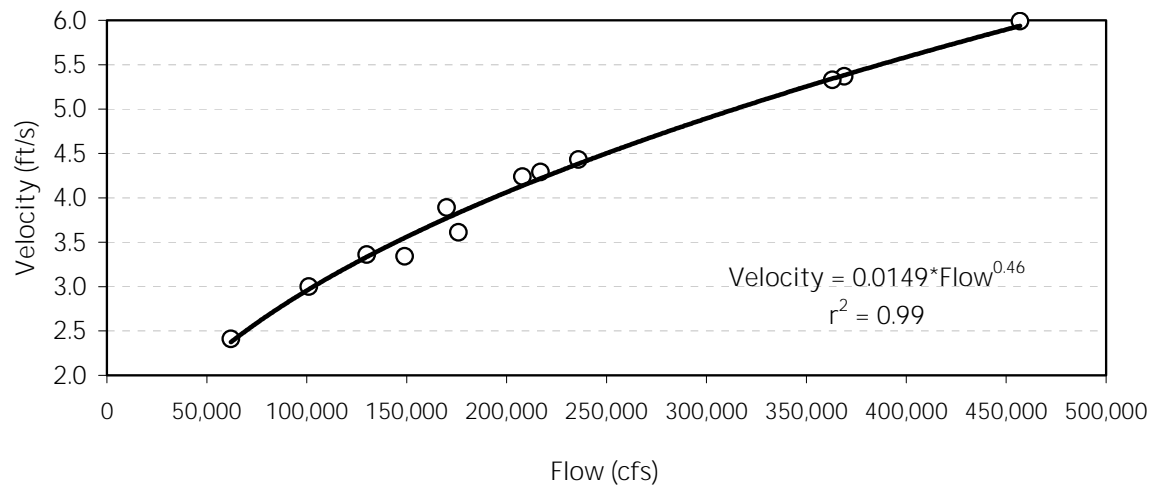
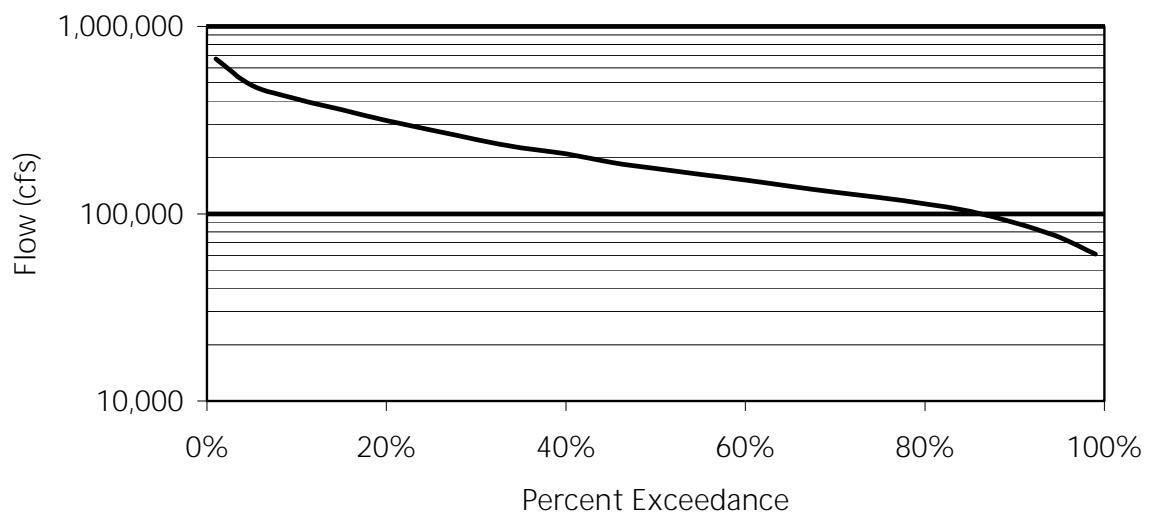
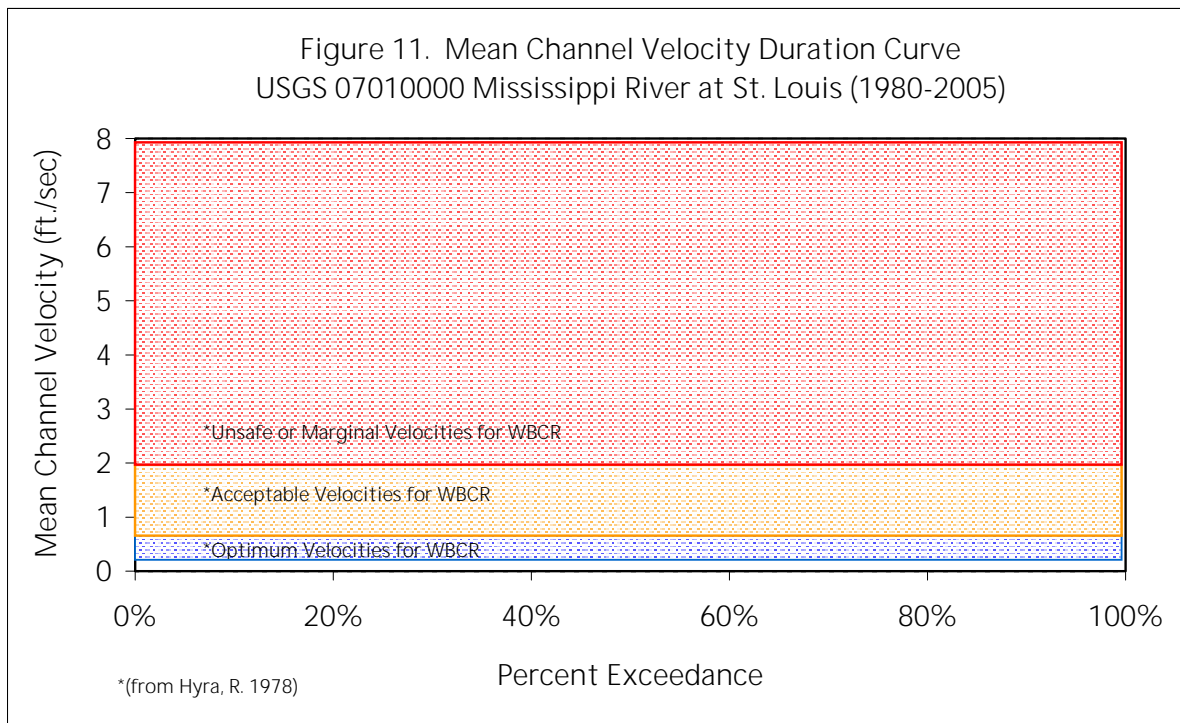


Figure 10. Flow Duration Curve
Mississippi River at St. Louis (1980-2005)





2. Substantial and Widespread Social and Economic Impact Prevent Use Attainment

MSD is in the process of developing a CSO Long Term Control Plan (LTCP). As part of the LTCP, the economic impacts of different CSO control options will be evaluated. The public participation process will also aid in determination the level of control and financial impact desired by the community. Other cities, such as Boston, Portland, and Milwaukee, have found that support of WBCR uses in urban areas is not economically feasible.

3. Whole Body Contact Recreation Use Attainability Conclusions

Data and information collected within this study suggest that two use attainability factors may prevent WBCR use attainment. Hydrologic modifications of the Mississippi River segment between the MDC North Riverfront Park Access and the Meramec River likely prevent WBCR use attainment. These hydrologic modifications result in conditions that present safety concerns with respect to WBCR uses. River channelization produces high channel velocities throughout the range of flows in this segment that result in marginal to unsafe swimming conditions based upon criteria developed by Hyra (1978). Hydrologic modifications also allow high volumes of barge traffic within the metropolitan St. Louis area, which present safety concerns for WBCR uses.

CSO controls within the MSD system to attain WBCR uses may also result in widespread social and economic impact that prevent use attainment. This use attainability factor will be further evaluated during MSD's CSO LTCP. Metropolitan St. Louis represents the second largest inland

port in the US Mitigation or reduction of barge traffic to provide safe recreational use conditions may also result in widespread socio-economic impacts.

V. CONCLUSIONS AND RECOMMENDATIONS

Study findings demonstrate that WBCR is an existing and attainable use on the Mississippi River above the Melvin Price Locks and Dam at Alton, Illinois. In addition, the proposed WBCR-A use designation is appropriate. Surveys identified kayaking uses from the Melvin Price Locks and Dam to the MDC North Riverfront Park. However, lack of water quality data and unknown classification of kayaking within MDNR's tiered recreational use framework prevent conclusive identification of existing or attainable recreational uses. If WBCR use is deemed existing or attainable, the most appropriate recreational designated use for this segment is WBCR-B.

From the MDC North Riverfront Park to the Meramec River, WBCR is not an existing use and may be removed based upon hydrologic modifications that prevent use attainment (UAA Factor 4). The existing use recommendation is based upon no or very limited WBCR use due to limited access, barge traffic and fast currents, which make swimming very unsafe. Hydraulic data demonstrate that hydrologic modifications produce high channel velocities and unsafe swimming conditions throughout most river flows. Therefore, WBCR should not be considered an existing or attainable use for this Mississippi River segment.

VI. REFERENCES

Dufour, A., T. Ericksen, R. Ballentine, V. Cabelli, M. Goldberg, and W. Fox. 1986. Ambient Water Quality Criteria for Bacteria. US EPA #440/5-84-002, Office of Water, Washington, DC.

Hyra, R. 1978. Methods for Assessing Instream Flows for Recreation. Cooperative Instream Flow Service Group, Fort Collins, CO.

US Army Corps of Engineers. 2004. *usace.army.mil*. Retrieved December 3, 2004, <<http://www.iwr.usace.army.mil/ndc/lpms/lpms..htm>>

Wigal, J. 2002. Draft Implementation Guidance for Ambient Water Quality Criteria for Bacteria. US EPA #823/B-02-003, Office of Water, Washington, D.C.

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

Appendix A Use Attainability Analysis Forms and Mississippi River Site Photographs

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet A – Water Body Identification

Water Body Name: Mississippi River
(from USGS 7.5' quad) _____
8 digit FUC: 07110009 (Upstream) to 07140101 (Downstream) _____
Missouri WBID: 0001 (Upstream) to 1707 (Downstream) _____
County: St. Charles (Upstream) to St. Louis (Downstream) _____
Upstream Legal Description: NW ¼ NW ¼ Sec. 2 T48N R5E _____
Downstream Legal Description: S1/2 Sec. T42N R6E _____
Upstream Coordinates: _____
(USGS 84, dd.dddd) 38.96515, -90.42759 _____
Downstream Coordinates: _____
(USGS 84, dd.dddd) 38.39023, -90.33923 _____
Discharger Facility Name(s): N/A _____
Discharger Permit Number(s): N/A _____
Number of Sites Evaluated: Two (2) _____
Name of Surveyor and Telephone Number: Trent Stober (573) 443-4100 _____
Organization: MEC Water Resources, Inc _____
Position: Senior Project Manager _____

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on this UAA datasheet is true and accurate.

Signed: _____

Date: 7/7/05

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization

(A separate data sheet must be completed for each site)

Missouri WD # 1707 Site Location Description: _____
 Site Lat/Long: 38.62424 / -90.18460 River bank near Arch _____
 Date & Time 10/25/04 15:10 Locality Name: _____
 Personnel Cassidy Leubkeberg Permit Number: _____
 Current Weather Conditions: P Cloudy Weather Conditions for Past 7 days: _____
 Photo Ids. Upstream: ✓ Downstream: ✓ Other: See Appendix A, page 2

Used Observed*:
 Swimming _____ Skin Diving _____ SCUBA diving _____ Tubing _____ Water Skiing _____
 Wind surfing _____ Kayaking _____ ☒ Boating _____ Wading _____ Rafting _____
 Hunting _____ Trapping _____ Fishing _____ None of the above ☒ Other _____
 Describe (include number of individuals recreating, frequency of use, photo-documentation of evidence of recreational uses, etc.)

One individual sitting at the edge of the water

Surrounding Conditions*: (Mark all that provide or influence recreational uses. Attach photos of evidence of potential impacts of interest.)
☒ City/county parks _____ Playgrounds _____ MDC conservation lands _____ ☒ Urban areas _____ Campgrounds _____
☒ Boating accesses _____ State parks _____ National forests _____ Nature trails _____ ☒ Sidewalkway _____
 No trespass sign _____ Fence _____ Steep slopes _____ Other: _____

Evidence of Human Use*:
☒ Roads _____ Foot _____ ☒ Dock/pier/etc _____ Livestock _____ RVs/V Tracks _____
 Rope swings _____ Camping sites _____ Fire pit/irrig _____ Watering _____ Fishing Tackle _____
 Other: _____

Site Locations Map(s): Attach a map of entire segment with assessment sites clearly labeled. Mark any other items that may be of interest. (Include photographs)

*Some of this information is not intended to directly influence a decision on any one particular project or use and may point to conditions that need further analysis or that affect another use.

Page Two - Data Sheet B for WBID #:

Stream Morphology:

Upstream View Physical Dimensions:

<u>Riffle</u>	<u>Width</u> (ft)	<u>Length</u> (ft)	<u>Ave. Depth</u> (ft)	<u>Max. Depth</u> (ft)
<input checked="" type="checkbox"/> <u>Run</u>	<u>Width</u> (ft)	<u>Length</u> (ft)	<u>Ave. Depth</u> (ft)	<u>Max. Depth</u> (ft)
<u>Pool</u>	<u>Width</u> (ft)	<u>Length</u> (ft)	<u>Ave. Depth</u> (ft)	<u>Max. Depth</u> (ft)
<input checked="" type="checkbox"/> <u>Flow</u>	<u>Present?</u>	<input checked="" type="radio"/> <u>Yes</u> <input type="radio"/> <u>No</u>	<u>Estimated</u> (ft/sec)	

Downstream View Physical Dimensions:

<u>Riffle</u>	<u>Width</u> (ft)	<u>Length</u> (ft)	<u>Ave. Depth</u> (ft)	<u>Max. Depth</u> (ft)
<input checked="" type="checkbox"/> <u>Run</u>	<u>Width</u> (ft)	<u>Length</u> (ft)	<u>Ave. Depth</u> (ft)	<u>Max. Depth</u> (ft)
<u>Pool</u>	<u>Width</u> (ft)	<u>Length</u> (ft)	<u>Ave. Depth</u> (ft)	<u>Max. Depth</u> (ft)
<input checked="" type="checkbox"/> <u>Flow</u>	<u>Present?</u>	<input checked="" type="radio"/> <u>Yes</u> <input type="radio"/> <u>No</u>	<u>Estimated</u> (ft/sec)	

Substrate*: (These values should add up to 100%)

<u>%Gravel</u>	<u>%Coarse Sand</u>	<u>%Fine Sand</u>	<u>%Silt</u>	<u>%Mud/Clay</u>	<u>%Bedrock</u>
----------------	---------------------	-------------------	--------------	------------------	-----------------

* (Check to see if placement is into the water

Aquatic Vegetation*: (note amount of vegetation or algal growth at the assessment site)

<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
----------	----------	----------	----------	----------

Water Characteristics*: (Mark all that apply.)

<u>Odor</u>	<u>Sewage</u>	<u>Musky</u>	<u>Chemical</u>	<input checked="" type="checkbox"/> <u>None</u>	<u>Other</u>
<u>Color</u>	<u>Clear</u>	<u>Green</u>	<u>Gray</u>	<u>Milky</u>	<input checked="" type="checkbox"/> <u>Other</u> <u>& Brown</u>
<u>Bottom Deposit:</u>	<u>Sludge</u>	<u>Solids</u>	<u>Fine sediments</u>	<input checked="" type="checkbox"/> <u>None</u>	<u>Other</u>
<u>Surface Deposit:</u>	<u>Oil</u>	<u>Scum</u>	<u>Foam</u>	<input checked="" type="checkbox"/> <u>None</u>	<u>Other</u>

Comments: Please attach additional comments (including information from interviews) to this form.

This information is not to be used solely for removal or whole body contact recreation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreation use analysis but may point to conditions that need further analysis or that affect another use.

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on this UAA datasheet is true and accurate.

Signed: Carly Schilling

Date: 10/24/11

Organization: MCC Waters

Position: Environmental Specialist

Field Data Sheets for Recreational Use Stream Surveys

Data Sheet B – Site Characterization

(A separate data sheet must be completed for each site)

Missouri WBD# 1707 Site Location Description: _____
 Site Lat./long: 38° 14' 52" / -90° 19' 17" North River Trout Park
 Date & Time: 10/24/04 13:45 Facility Name: _____
 Personnel: Cassidy & Ashboring Permit Number: _____
 Current Weather Conditions: Clear Weather Conditions for Past 7 days: _____
 Photo Ids: Upstream Downstream Other: Here & Downstream

Used/Observed*:

<u>Swimming</u>	<u>Scuba diving</u>	<u>SCUBA diving</u>	<u>Tubing</u>	<u>Water Skiing</u>
<u>Wind surfing</u>	<u>Kayaking</u>	<u>Boating</u>	<u>Wading</u>	<u>Rafting</u>
<u>Hunting</u>	<u>Trapping</u>	<u>Fishing</u>	<input checked="" type="checkbox"/> <u>None of the above</u>	<input checked="" type="checkbox"/> <u>Other</u>

Describe (include number of individuals recreating, frequency of use, photo documentation of evidence of recreational uses, etc.)

Individuals using parking lot as a meeting place, MDC survey park

Surrounding Conditions* (Mark all that are present or indicate recreational uses. Attach photos or evidence of unusual items of interest):

<input checked="" type="checkbox"/> <u>City/county parks</u>	<u>Playgrounds</u>	<input checked="" type="checkbox"/> <u>MDC conservation lands</u>	<input checked="" type="checkbox"/> <u>Urban areas</u>	<u>Campgrounds</u>
<input checked="" type="checkbox"/> <u>Boating accesses</u>	<u>State parks</u>	<u>National forests</u>	<u>Nature trails</u>	<u>Stairs/walkway</u>
<u>No trespass sign</u>	<u>Fence</u>	<u>Steep slopes</u>	<u>Other</u>	

Evidence of Human Use*:

<u>Roads</u>	<u>Foot paths/prints</u>	<u>Dock/platform</u>	<u>Livestock</u>	<u>RV/ATV Tracks</u>
<u>Rope swings</u>	<u>Camping Sites</u>	<u>Fire pit/irrig</u>	<u>NPDES Discharge</u>	<u>Fishing Tackle</u>

☒ Other

Bent Lamp, trash

Site Locations Map(s): Attach a map of entire segment with assessment sites clearly labeled. Mark any other items that may be of interest. (Include photographs)

*Some of this information is not intended to directly influence a decision on any one part of a stream reach, but may point to areas that need further analysis or that affect another use.

Page Two – Data Sheet B for WBID #:

Stream Morphology:

Upstream View Physical Dimensions:

<u>Rifle</u>	<u>Width(ft)</u>	<u>Length(ft)</u>	<u>Ave. Depth(ft)</u>	<u>Max. Depth(ft)</u>
<u>Run</u>	<u>Width(ft)</u>	<u>Length(ft)</u>	<u>Ave. Depth(ft)</u>	<u>Max. Depth(ft)</u>
<u>X Pool</u>	<u>Width(ft)</u>	<u>Length(ft)</u>	<u>Ave. Depth(ft)</u>	<u>Max. Depth(ft)</u>
<u>Flow</u>	<u>Present?</u>	<u>No</u>	<u>Estimated (ft/sec)</u>	

Downstream View Physical Dimensions:

<u>Rifle</u>	<u>Width(ft)</u>	<u>Length(ft)</u>	<u>Ave. Depth(ft)</u>	<u>Max. Depth(ft)</u>
<u>Run</u>	<u>Width(ft)</u>	<u>Length(ft)</u>	<u>Ave. Depth(ft)</u>	<u>Max. Depth(ft)</u>
<u>X Pool</u>	<u>Width(ft)</u>	<u>Length(ft)</u>	<u>Ave. Depth(ft)</u>	<u>Max. Depth(ft)</u>
<u>Flow</u>	<u>Present?</u>	<u>No</u>	<u>Estimated (ft/sec)</u>	

Substrate*: (These values should add up to 100%.)

%Cobble %Gravel %Sand %Silt %Mud/Clay %Bedrock

Aquatic Vegetation*: (note amount of vegetation or algal growth at the assessment site)

Water Characteristics* (Mark all that apply.)

<u>Odor</u>	<u>Sewage</u>	<u>Musky</u>	<u>Chemical</u>	<u>None</u>	<u>Other</u>
<u>Color</u>	<u>Clear</u>	<u>Green</u>	<u>Gray</u>	<u>Milky</u>	<u>Other (i.e. Brown)</u>
<u>Bottom Deposit</u>	<u>Sludge</u>	<u>Sands</u>	<u>Fine sediments</u>	<u>None</u>	<u>Other</u>
<u>Surface Deposit</u>	<u>Oil</u>	<u>Scum</u>	<u>Foam</u>	<u>None</u>	<u>Other</u>

Comments: Please attach additional comments (including information from interviews) to this form.

This information is not to be used solely for removal of whole body contact recreation but rather is to provide a more comprehensive understanding of water conditions. Consequently, this information is not intended to directly influence a decision on the recreational use analysis, but may point to conditions that need further analysis or that affect another use.

I, the undersigned, hereby affirm to the best of my knowledge, that all information reported on this UAA datasheet is true and accurate.

Signed: [Signature] Date 10/28/09

Organization: WLC Waters Position: Environmental Specialist

Appendix A Mississippi River Site Photographs

North Riverfront Park (Downstream)



North Riverfront Park (Upstream)



Mississippi River at Jefferson National Expansion Memorial Park (Upstream)



Mississippi River at Jefferson National Expansion Memorial Park (downstream)



MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

Appendix B. Mississippi River Bacteria Data

Mississippi River at Alton & Grafton, IL			
Date (M/D/Y)	Flow (cfs)	Fecal Coliform (col./100 mL)	<i>E. coli</i> (col./100 mL)
01/13/75	120,000	1,500	-----
01/27/75	117,000	270	-----
02/11/75	210,000	100	-----
02/26/75	201,000	140	-----
03/11/75	204,000	100	-----
03/26/75	257,000	530	-----
04/07/75	283,000	130	-----
04/22/75	132,000	67	-----
05/06/75	177,000	110	-----
05/20/75	42,200	110	-----
06/17/75	68,500	2,100	-----
07/08/75	41,800	1,100	-----
08/12/75	36,500	190	-----
09/08/75	87,100	130	-----
10/07/75	38,900	60	-----
11/11/75	65,700	90	-----
12/09/75	245,000	700	-----
01/20/76	199,000	80	-----
02/10/76	177,000	480	-----
03/09/76	67,200	2,200	-----
04/12/76	37,300	180	-----
05/11/76	22,100	370	-----
06/08/76	20,300	250	-----
07/13/76	25,800	440	-----
10/12/76	23,200	6,600	-----
11/09/76	84,600	1,700	-----
12/14/76	42,100	370	-----
02/07/77	58,600	60	-----
03/15/77	29,900	120	-----
04/19/77	42,300	50	-----
05/18/77	76,400	120	-----
06/22/77	97,700	70	-----
07/12/77	164,000	53	-----
08/16/77	93,500	400	-----
09/13/77	215,000	440	-----
10/26/77	248,000	4,500	-----
11/21/77	183,000	1,000	-----
03/21/78	122,000	900	-----
04/27/78	176,000	270	-----
05/24/78	159,000	2,400	-----
06/20/78	54,700	3,600	-----
07/20/78	83,400	250	-----
09/21/78	71,300	2,400	-----
10/26/78	41,300	280	-----
11/30/78	45,100	1,200	-----
12/19/78	406,000	150	-----
01/23/79	251,000	75	-----
02/14/79	82,000	140	-----
04/19/79	168,000	100	-----
05/24/79	73,500	100	-----
07/25/79	38,000	300	-----
08/23/79	87,800	1,000	-----
09/19/79	39,200	190	-----
10/18/79	76,100	200	-----
11/29/79	85,100	80	-----
12/20/79	122,000	20	-----
01/18/80	131,000	180	-----
02/21/80	88,100	20	-----
03/21/80	220,000	140	-----
04/04/80	53,000	200	-----
05/08/80	99,700	120	-----
06/05/80	140,000	2,400	-----
07/10/80	94,400	700	-----
08/14/80	77,700	200	-----
09/18/80	43,000	1,200	-----
10/09/80	40,000	230	-----
11/06/80	31,800	150	-----

Mississippi River at Alton & Grafton, IL			
Date (M/D/Y)	Flow (cfs)	Fecal Coliform (col./100 mL)	<i>E. coli</i> (col./100 mL)
12/04/80	135,000	40	-----
01/08/81	95,800	20	-----
02/12/81	134,000	10	-----
03/05/81	113,000	60	-----
04/09/81	250,000	8	-----
05/07/81	160,000	46	-----
06/05/81	176,000	210	-----
07/09/81	181,000	1,100	-----
08/06/81	59,100	1,200	-----
09/04/81	127,000	920	-----
11/05/81	204,000	1,600	-----
01/07/82	-----	1,500	-----
03/11/82	150,000	36	-----
05/13/82	97,400	280	-----
05/13/82	153,000	230	-----
07/16/82	190,000	110	-----
09/24/82	207,000	400	-----
11/05/82	249,000	2,200	-----
01/07/83	148,000	950	-----
03/10/83	104,000	640	-----
05/13/83	91,800	110	-----
07/21/83	104,000	180	-----
09/30/83	81,100	84	-----
11/17/83	263,000	590	-----
01/12/84	222,000	700	-----
03/15/84	43,400	120	-----
05/17/84	147,000	480	-----
07/11/84	131,000	300	-----
09/06/84	345,000	320	-----
11/08/84	158,000	2,300	-----
01/10/85	84,800	700	-----
03/13/85	-----	220	-----
05/09/85	83,000	28	-----
07/11/85	271,000	50	-----
09/18/85	72,300	10	-----
09/18/85	169,000	10	-----
11/21/85	198,000	4,500	-----
01/09/86	153,000	4,200	-----
03/13/86	109,000	70	-----
05/15/86	131,000	30	-----
07/10/86	86,300	90	-----
09/18/86	103,000	40	-----
11/20/86	65,600	50	-----
01/08/87	25,300	540	-----
03/04/87	43,200	12	-----
05/13/87	69,300	4	-----
07/08/87	67,800	12,000	-----
09/16/87	110,000	250	-----
11/04/87	63,100	4	-----
01/13/88	35,600	14	-----
03/03/88	31,500	140	-----
05/18/88	31,500	4	-----
07/13/88	38,700	64	-----
09/14/88	39,100	10	-----
09/14/88	75,300	24	-----
11/03/88	85,000	10	-----
01/11/89	81,000	68	-----
03/14/89	79,600	8	-----
03/14/89	46,600	16	-----
05/04/89	42,000	6	-----
05/04/89	58,800	120	-----
07/13/89	60,100	7	-----
07/13/89	35,600	6	-----
09/07/89	37,200	25	-----
09/07/89	76,700	31	-----
11/13/89	93,500	32	-----
01/10/90	167,000	40	-----

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

Mississippi River at Alton & Grafton, IL				Mississippi River at Alton & Grafton, IL			
Date (M/D/Y)	Flow (cfs)	Fecal Coliform (col./100 mL)	<i>E. coli</i> (col./100 mL)	Date (M/D/Y)	Flow (cfs)	Fecal Coliform (col./100 mL)	<i>E. coli</i> (col./100 mL)
03/08/90	148,000	44	-----	08/12/98	94,700	110	-----
05/03/90	74,900	170	-----	09/01/98	139,000	29	24
06/11/90	140,000	3,700	-----	10/14/98	175,000	82	86
09/06/90	204,000	180	-----	11/23/98	121,000	64	120
11/07/90	236,000	920	-----	12/08/98	115,000	72	42
01/16/91	130,000	210	-----	02/02/99	193,000	160	260
03/20/91	85,100	120	-----	02/25/99	254,000	9	8
05/17/91	152,000	3,900	-----	03/17/99	244,000	7	10
07/18/91	75,800	66	-----	04/12/99	258,000	250	270
09/19/91	224,000	50	-----	04/20/99	252,000	890	1,200
11/26/91	97,900	1,000	-----	05/10/99	240,000	80	78
01/22/92	95,800	56	-----	05/24/99	123,000	190	170
03/24/92	62,900	500	-----	06/07/99	137,000	94	240
05/20/92	120,000	10	-----	06/21/99	59,500	210	220
07/14/92	211,000	210	-----	07/24/99	45,900	2	6
09/09/92	157,000	14	-----	08/09/99	50,000	18	18
11/10/92	87,000	80	-----	09/13/99	68,600	13	12
12/18/92	209,000	9,600	-----	10/19/99	36,700	58	27
01/28/93	273,000	130	-----	11/22/99	184,000	30	11
02/19/93	364,000	22	-----	12/07/99	96,400	190	220
03/16/93	217,000	52	-----	01/19/00	62,400	150	160
04/06/93	429,000	130	-----	02/14/00	94,200	6	8
05/13/93	491,000	250	-----	03/13/00	179,000	12	150
06/02/93	303,000	160	-----	04/03/00	267,000	32	32
07/15/93	185,000	390	-----	05/04/00	209,000	26	68
07/17/93	-----	2,200	-----	06/09/00	77,800	210	22
09/01/93	114,000	100	-----	06/26/00	52,500	720	320
10/14/93	-----	36	-----	07/10/00	44,500	660	260
11/08/93	125,000	86	-----	08/11/00	56,600	35	28
11/08/93	195,000	86	-----	09/11/00	94,400	3	10
12/01/93	135,000	84	-----	10/02/00	81,700	22	4
12/01/93	339,000	84	-----	11/07/00	256,000	60	58
03/09/94	185,000	240	-----	02/06/01	153,000	72	64
03/31/94	-----	62	-----	02/21/01	257,000	18	8
04/14/94	200,000	2,400	-----	03/01/01	158,000	170	160
05/03/94	180,000	600	-----	03/07/01	255,000	10	2
05/24/94	73,000	36	-----	03/21/01	326,000	130	140
06/06/94	90,000	300	-----	04/02/01	336,000	24	29
07/06/94	50,000	40	-----	04/16/01	284,000	300	140
08/02/94	33,700	16	-----	04/30/01	296,000	96	65
09/09/94	74,000	14	-----	05/14/01	76,800	1,100	120
09/14/94	250,000	7	-----	06/06/01	83,900	1,100	940
10/23/96	220,000	110	-----	06/11/01	66,900	140	200
01/07/97	172,000	16	-----	07/16/01	61,300	4	12
02/26/97	288,000	720	-----	08/06/01	68,800	4	2
03/11/97	227,000	110	-----	09/12/01	93,400	2	2
04/03/97	142,000	100	-----	10/15/01	63,200	140	87
04/23/97	193,000	620	-----	11/19/01	88,300	8	7
05/06/97	106,000	210	-----	12/03/01	126,000	98	92
06/02/97	286,000	54	-----	01/16/02	94,200	5	1
06/27/97	69,200	43	-----	02/11/02	271,000	8	4
07/08/97	69,500	110	-----	03/12/02	231,000	23	35
08/05/97	63,400	15	-----	04/01/02	146,000	-----	11
09/11/97	46,100	17	-----	05/06/02	86,000	36	30
10/16/97	79,500	4	6	06/03/02	74,100	25	8
11/12/97	108,000	22	52	07/08/02	102,000	6	4
12/04/97	126,000	110	130	08/12/02	76,700	8	3
01/22/98	197,000	83	54	09/09/02	47,700	8	1
02/17/98	329,000	200	100	10/21/02	41,200	160	110
03/17/98	250,000	45	28	11/06/02	39,800	56	32
03/23/98	173,000	190	180	12/02/02	55,500	31	8
04/14/98	192,000	77	120	02/19/03	79,200	120	28
05/05/98	221,000	180	150	03/04/03	215,000	22	24
05/19/98	286,000	78	68	03/18/03	169,000	37	56
06/02/98	118,000	44	58	04/21/03	106,000	15	6
06/15/98	93,700	1,400	1,600	05/05/03	63,400	210	110
07/06/98	67,300	150	540	06/02/03	28,400	13	7

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

Mississippi River at Alton & Grafton, IL			
Date (M/D/Y)	Flow (cfs)	Fecal Coliform (col./100 mL)	<i>E. coli</i> (col./100 mL)
07/07/03	29,400	10	8
08/04/03	57,800	120	55
09/08/03	66,800	29	27
10/22/03	43,400	6	1
11/12/03	177,000	46	27
12/01/03	224,000	22	34
01/12/04	167,000	42	11
02/23/04	92,200	10	13
03/08/04	276,000	170	60
04/14/04	159,000	17	21
05/10/04	90,100	58	22
06/14/04	58,100	350	200
07/12/04	-----	31	49
08/09/04	-----	110	120
09/20/04	-----	24	23

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

Mississippi River at Thebes, IL				Mississippi River at Thebes, IL			
Date (M/D/Y)	Flow (cfs)	Fecal Coliform (col./100 mL)	<i>E. coli</i> (col./100 mL)	Date (M/D/Y)	Flow (cfs)	Fecal Coliform (col./100 mL)	<i>E. coli</i> (col./100 mL)
01/28/75	170,000	1,400	-----	01/19/81	63,900	1,500	-----
02/18/75	142,000	3,000	-----	02/23/81	112,000	500	-----
03/19/75	286,000	700	-----	03/30/81	90,100	460	-----
04/16/75	263,000	1,800	-----	04/15/81	210,000	1,500	-----
05/21/75	359,000	4,600	-----	05/11/81	192,000	1,800	-----
06/18/75	258,000	10,200	-----	06/01/81	237,000	16,000	-----
07/17/75	231,000	840	-----	08/10/81	295,000	3,400	-----
08/12/75	117,000	1,700	-----	09/01/81	185,000	3,400	-----
09/08/75	171,000	35,000	-----	11/02/81	164,000	10,000	-----
10/17/75	126,000	8,000	-----	01/08/82	145,000	2,400	-----
11/19/75	149,000	4,400	-----	03/02/82	445,000	500	-----
12/16/75	170,000	4,900	-----	05/03/82	336,000	5,800	-----
01/27/76	96,300	2,900	-----	07/21/82	341,000	49,000	-----
02/26/76	196,000	1,450	-----	09/22/82	225,000	5,300	-----
03/23/76	280,000	1,600	-----	11/23/82	248,000	4,200	-----
04/22/76	273,000	2,500	-----	01/18/83	207,000	1,800	-----
05/20/76	269,000	3,200	-----	03/25/83	385,000	3,000	-----
06/21/76	160,000	5,000	-----	05/24/83	488,000	8,200	-----
07/20/76	96,100	4,300	-----	07/06/83	313,000	9,800	-----
08/17/76	98,800	7,000	-----	09/02/83	153,000	4,200	-----
09/21/76	61,300	8,900	-----	10/05/83	150,000	5,000	-----
10/22/76	68,700	3,200	-----	11/09/83	215,000	3,100	-----
11/23/76	75,000	2,200	-----	01/04/84	136,000	3,100	-----
12/16/76	64,200	1,400	-----	01/26/84	133,000	1,800	-----
01/18/77	54,000	1,000	-----	02/16/84	250,000	820	-----
02/02/77	50,000	640	-----	03/08/84	460,000	1,600	-----
03/02/77	135,000	800	-----	04/04/84	494,000	1,800	-----
04/07/77	174,000	2,000	-----	05/01/84	521,000	30,000	-----
05/02/77	120,000	4,800	-----	06/06/84	415,000	1,900	-----
06/14/77	109,000	9,400	-----	07/17/84	358,000	2,100	-----
07/26/77	95,000	4,200	-----	08/23/84	142,000	1,000	-----
08/24/77	118,000	4,800	-----	09/11/84	122,000	9,000	-----
09/20/77	295,000	7,000	-----	11/15/84	261,000	3,300	-----
11/30/77	144,000	7,800	-----	12/19/84	219,000	2,700	-----
12/21/77	211,000	3,800	-----	01/30/85	129,000	2,500	-----
01/30/78	194,000	2,400	-----	02/13/85	134,000	1,000	-----
02/16/78	82,600	3,800	-----	03/12/85	631,000	780	-----
03/29/78	625,000	900	-----	04/12/85	442,000	2,700	-----
04/25/78	513,000	800	-----	05/15/85	267,000	840	-----
05/30/78	296,000	2,900	-----	06/19/85	300,000	3,000	-----
06/28/78	251,000	7,400	-----	07/16/85	155,000	2,400	-----
07/25/78	276,000	2,200	-----	08/14/85	132,000	13,000	-----
08/17/78	146,000	7,200	-----	10/22/85	343,000	2,400	-----
09/11/78	152,000	2,100	-----	11/20/85	560,000	3,600	-----
10/02/78	200,000	14,000	-----	12/17/85	334,000	1,100	-----
01/16/79	70,000	1,200	-----	01/22/86	165,000	220	-----
03/08/79	474,000	2,000	-----	02/20/86	216,000	510	-----
04/04/79	622,000	24,000	-----	03/19/86	322,000	1,600	-----
05/30/79	309,000	4,800	-----	04/29/86	316,000	1,100	-----
06/26/79	222,000	7,500	-----	05/29/86	478,000	1,600	-----
07/18/79	211,000	5,700	-----	06/25/86	235,000	8,800	-----
08/28/79	227,000	7,800	-----	07/23/86	310,000	2,600	-----
09/26/79	124,000	8,400	-----	08/05/86	211,000	2,000	-----
10/24/79	94,600	12,000	-----	09/04/86	160,000	1,800	-----
11/19/79	155,000	2,400	-----	10/29/86	494,000	2,800	-----
12/19/79	106,000	1,700	-----	11/13/86	332,000	3,500	-----
01/21/80	117,000	1,300	-----	12/10/86	340,000	1,200	-----
02/26/80	148,000	2,500	-----	01/21/87	178,000	650	-----
03/25/80	230,000	1,300	-----	02/19/87	163,000	250	-----
04/14/80	303,000	1,500	-----	03/16/87	196,000	430	-----
05/27/80	121,000	7,200	-----	04/16/87	401,000	1,200	-----
06/16/80	256,000	19,000	-----	05/28/87	189,000	3,400	-----
07/21/80	87,500	2,400	-----	06/10/87	208,000	2,500	-----
09/09/80	214,000	140,000	-----	07/23/87	153,000	6,000	-----
10/07/80	191,000	20,000	-----	08/04/87	136,000	1,300	-----
11/03/80	132,000	3,300	-----	09/02/87	253,000	8,000	-----
12/15/80	157,000	14,000	-----	10/15/87	94,200	4,500	-----

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

Mississippi River at Thebes, IL

Date (M/D/Y)	Flow (cfs)	Fecal Coliform (col./100 mL)	<i>E. coli</i> (col./100 mL)
11/19/87	113,000	2,600	-----
12/16/87	192,000	1,400	-----
01/27/88	201,000	400	-----
02/10/88	196,000	520	-----
03/09/88	258,000	640	-----
04/20/88	252,000	320	-----
05/25/88	128,000	4,700	-----
06/23/88	73,000	64	-----
07/20/88	79,700	3,200	-----
08/17/88	73,900	2,200	-----
09/28/88	93,400	16,000	-----
11/10/88	76,100	5,200	-----
12/20/88	57,700	880	-----
01/19/89	96,700	310	-----
02/16/89	89,900	540	-----
04/25/89	151,000	1,500	-----
05/24/89	116,000	2,000	-----
06/21/89	120,000	6,900	-----
07/20/89	71,400	1,100	-----
09/13/89	289,000	12,000	-----
11/08/89	93,200	8,300	-----
01/04/90	57,800	770	-----
03/14/90	230,000	9,800	-----
05/09/90	335,000	4,600	-----
06/13/90	467,000	8,000	-----
07/18/90	252,000	6,000	-----
09/13/90	126,000	8,400	-----
11/14/90	112,000	120	-----
01/23/91	260,000	2,000	-----
03/27/91	285,000	580	-----
05/13/91	395,000	2,700	-----
05/13/91	395,000	2,700	-----
07/23/91	169,000	2,800	-----
09/17/91	116,000	2,100	-----
11/20/91	162,000	10,000	-----
12/18/91	230,000	680	-----
02/04/92	123,000	680	-----
03/25/92	340,000	5,300	-----
05/19/92	169,000	3,700	-----
07/01/92	131,000	4,800	-----
07/01/92	131,000	4,800	-----
09/22/92	242,000	18,000	-----
11/11/92	184,000	1,700	-----
01/21/93	263,000	430	-----
03/17/93	446,000	550	-----
05/18/93	622,000	1,500	-----
07/07/93	626,000	810	-----
07/20/93	885,000	340	-----
08/16/93	-----	440	-----
08/19/93	-----	3,400	-----
11/23/93	379,000	670	-----
01/06/94	148,000	110	-----
03/17/94	334,000	480	-----
03/30/94	-----	40	-----
05/04/94	562,000	920	-----
06/23/94	-----	100	-----
07/26/94	197,000	260	-----
09/08/94	118,000	140	-----
01/12/95	95,200	280	-----
03/21/95	234,000	220	-----
05/23/95	855,000	1,200	-----
07/27/95	251,000	1,000	-----
09/06/95	165,000	250	-----
11/06/95	205,000	410	-----
11/27/95	175,000	280	-----
12/12/95	129,000	120	-----
01/22/96	132,000	260	-----

Mississippi River at Thebes, IL

Date (M/D/Y)	Flow (cfs)	Fecal Coliform (col./100 mL)	<i>E. coli</i> (col./100 mL)
02/20/96	155,000	270	-----
03/12/96	142,000	440	440
03/26/96	188,000	660	-----
04/08/96	212,000	210	-----
04/22/96	219,000	2,300	-----
05/06/96	450,000	1,400	-----
05/22/96	496,000	310	-----
06/17/96	480,000	520	-----
07/17/96	236,000	380	-----
08/12/96	233,000	190	-----
09/09/96	129,000	220	-----
10/21/96	124,000	100	-----
12/16/96	191,000	1,000	-----
01/27/97	161,000	640	-----
02/24/97	441,000	580	-----
03/12/97	405,000	260	-----
03/26/97	343,000	81	-----
04/15/97	442,000	440	-----
04/28/97	492,000	210	-----
05/22/97	284,000	150	-----
06/11/97	246,000	160	-----
07/21/97	220,000	260	-----
08/13/97	175,000	60	-----
08/20/97	192,000	310	-----
09/17/97	141,000	400	-----
10/20/97	165,000	140	150
11/24/97	148,000	110	96
01/07/98	196,000	2,200	620
02/02/98	161,000	110	100
03/04/98	278,000	240	200
03/24/98	542,000	2,400	3,900
04/16/98	579,000	430	570
05/07/98	453,000	420	230
05/21/98	267,000	96	100
06/10/98	282,000	4,600	2,600
06/22/98	454,000	1,000	1,000
07/22/98	271,000	430	290
08/11/98	252,000	510	220
08/26/98	152,000	110	220
09/09/98	130,000	110	100
10/21/98	332,000	210	210
12/14/98	224,000	1,100	1,300
01/27/99	321,000	1,300	1,000
02/22/99	270,000	240	160
03/10/99	254,000	980	560
03/29/99	220,000	88	62
04/21/99	490,000	1,400	1,000
04/29/99	512,000	420	500
05/20/99	450,000	356	-----
05/25/99	488,000	620	420
06/09/99	463,000	140	200
06/23/99	378,000	260	40
07/26/99	230,000	48	35
08/11/99	222,000	280	310
09/01/99	158,000	62	20
10/13/99	121,000	270	130
12/27/99	83,100	275	200
01/31/00	93,700	260	210
03/06/00	182,000	220	180
04/06/00	127,000	140	210
05/03/00	162,000	140	37
05/11/00	167,000	560	310
05/31/00	234,000	420	320
06/12/00	228,000	200	100
06/29/00	414,000	1,000	880
07/12/00	267,000	160	230
08/14/00	146,000	110	42

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

Mississippi River at Thebes, IL

Date (M/D/Y)	Flow (cfs)	Fecal Coliform (col./100 mL)	<i>E. coli</i> (col./100 mL)
08/21/00	129,000	240	220
09/06/00	111,000	48	23
10/04/00	100,000	220	50
11/30/00	114,000	420	200
01/08/01	79,400	48	130
02/07/01	161,000	680	540
03/05/01	369,000	480	340
03/19/01	395,000	580	540
04/09/01	308,000	58	90
04/17/01	382,000	460	200
05/02/01	420,000	220	92
05/15/01	459,000	820	210
06/05/01	397,000	700	1,000
06/13/01	612,000	200	250
07/18/01	210,000	100	10
08/08/01	168,000	160	140
09/11/01	110,000	420	330
10/17/01	144,000	270	170
11/26/01	117,000	360	380
01/14/02	108,000	88	58
02/13/02	149,000	54	25
03/06/02	158,000	92	44
03/25/02	211,000	320	52
04/03/02	179,000	62	50
04/15/02	244,000	480	320
04/29/02	376,000	840	110
05/09/02	504,000	2,800	1,400
05/14/02	751,000	1,800	1,300
06/12/02	377,000	360	120
07/10/02	197,000	100	46
08/14/02	125,000	440	400
09/11/02	123,000	34	21
10/23/02	160,000	340	240
12/09/02	75,200	320	120
01/13/03	81,600	210	85
02/18/03	95,700	230	44
03/05/03	103,000	220	110
04/01/03	144,000	120	78
04/10/03	134,000	250	330
04/28/03	240,000	110	230
05/07/03	372,000	470	280
05/13/03	472,000	640	600
06/23/03	197,000	130	46
07/09/03	180,000	45	2
07/21/03	241,000	440	110
08/06/03	125,000	29	21
09/10/03	93,100	76	90
10/20/03	85,600	100	69
12/08/03	92,000	87	40
01/14/04	122,000	200	28
02/11/04	88,000	20	13
03/10/04	448,000	1,000	300
03/22/04	213,000	54	48
04/05/04	318,000	410	46
04/26/04	184,000	780	230
05/12/04	157,000	28	18
05/24/04	298,000	350	150
06/02/04	468,000	940	580
06/16/04	396,000	170	92
07/14/04	257,000	150	42
08/11/04	166,000	72	92
09/01/04	323,000	780	550

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

Appendix C. Missouri River Hydrologic and Hydraulic Data**Discharge Measurements - Mississippi River at St. Louis**

Date	Personnel	Width (ft)	Area (ft ²)	Mean Velocity (ft/s)	Inside Gage Height (ft)	Outside Gage Height (ft)	Stream flow (cfs)
1/13/2003 12:35	HE/SSW	1500	25,700	2.41	-2.5	-2.5	62,000
12/20/2002 9:40	HE/SSW	1531	33,700	3	2.19	2.19	101,000
9/24/2002 10:30	HE/SSW	1548	38,900	2.94	4.1	4.12	115,000
4/10/2003 11:20	HE/SSW	1574	38,800	3.36	5.38	5.4	130,000
10/15/2002 10:00	HE/SSW	1553	44,600	3.34	7.54	7.54	149,000
4/26/2004 12:20	HE/PHR	1640	43,800	3.89	9.07	9.07	170,000
6/11/2003 12:05	HE/SSW	1665	48,700	3.61	10.24	10.21	176,000
8/29/2002 11:05	SSW/H E	1626	49,100	3.82	10.98	11	188,000
4/14/2004 9:33	HE/SSW	1660	49,100	4.24	12.3	12.35	208,000
7/17/2003 9:50	HE/SSW	1648	50,700	4.29	13.69	13.69	217,000
7/19/2004 12:10	HE/WEE	1660	53,200	4.43	14.36	14.32	236,000
9/1/2004 12:35	HOE/SES	1700	61,700	4.52	18.24		279,000
6/28/2004 10:24	WEE/SSW	1760	68,100	5.33	23.86		363,000
6/14/2004 10:37	HE/WEE	1770	68,700	5.37	23.52	23.52	369,000
6/4/2004 10:28	HE/WEE	1800	76,300	5.99	27.67	27.68	457,000

Flow and Velocity Frequency Data - Mississippi River at St. Louis

Frequency		Velocity
Percentile	Flow (cfs)	(fps)
99%	60,800	2.35
95%	75,000	2.58
90%	89,580	2.80
85%	103,000	2.99
80%	113,000	3.12
75%	122,000	3.23
70%	130,000	3.33
65%	140,000	3.44
60%	151,000	3.56
55%	162,000	3.68
50%	174,000	3.80
45%	188,000	3.94
40%	209,000	4.14
35%	225,000	4.28
30%	249,000	4.48
25%	280,000	4.73
20%	314,000	4.99
15%	360,000	5.31
10%	410,600	5.64
5%	484,000	6.08
1%	669,660	7.06

$$\text{Velocity} = 0.0149 \cdot \text{Flow}^{0.4593}$$

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

Appendix D

Recreational Use Survey Forms

RECREATIONAL USE SURVEY FORM
Missouri River and Mississippi River

The purpose of this survey is to aid in identifying current recreational uses of the Missouri River and Mississippi River.

Assessor Renee Martin Interviewed by dy Person By Phone
Date 1/5/05 Time 1145
Reason for the interviewee selection Patrol officer on Waterway.
Location Missouri River Mississippi River
Description (GPS optional) Mile marker 185-270 Miss. River

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Louis G. Amigheiti
Current Address P.O. Box 1368 Jeff City, MO 65102
Current Phone # 673.751-3333
Occupation Patrol officer
Age 23

PERSONAL USE - Characterize the personal use of the water by the surveyed individual

How long have you lived near this body of water? 1yr

Do you or your family utilize Missouri River and Mississippi River for water activities? YES or NO

If YES, please check the activities and approximate number of times and the season you did

ACTIVITIES	NUMBER OF TIMES PER PERIOD	SEASON	FLOW CONDITION
Swimming	<u>0</u>	<u>-</u>	<u>-</u>
Kayaking	<u>0</u>	<u>-</u>	<u>-</u>
Tubing	<u>0</u>	<u>-</u>	<u>-</u>
Rafting	<u>0</u>	<u>-</u>	<u>-</u>
Boating	<u>0</u>	<u>-</u>	<u>-</u>
Water Skiing	<u>0</u>	<u>-</u>	<u>-</u>
Other	<u>0</u>	<u>-</u>	<u>-</u>

NO reason why

Alternate H2O Source

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

WITNESSED USE - Characterize the observed use of the water by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	All the time	Spring/Summer	Normal
Kayaking	2 days / wk	Summer	
Tubing	1 x wk	Summer	
Rafting	4 days / wk	Summer	
Boating	7 days / wk	Spring/Summer	
Water Skiing	5 days / wk	Summer	
Other	Hunting/Fishing / Range Traffic	Summer/Fall/Winter	

If NO reasons why _____

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

ANECDOTAL USE- Characterize the anecdotal use of the water heard by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	Always	Spring/Summer	Normal
Kayaking	3-4 x wk	Summer	
Tubing	2 times wk	Summer	
Rafting	or Always 2 x wk	Summer	
Boating	or 3-4 x wk Always	All Seasons	
Water Skiing	3-4 x wk	Summer	
Other	Hunting/Fishing / Range Traffic	All seasons	

If NO reasons why _____

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

Signature of Assessor: _____

Steve Mart

Signature of Interviewed Individual _____

N/A

Date _____

1/6/05

The purpose of this survey is to aid in identifying current recreational uses of the Missouri River and Mississippi River.

Assessor Renee Martin Interviewed by By Person By Phone
 Date 1/10/05 Time 0930
 Reason for the interviewee selection USGS - Stream Gauging
 Location Missouri River Mississippi River
 Description (GPS optional) St. Charles Alton/Grayton/Eats Bridge

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Hugh Edwards
 Current Address Olivet St. Louis USGS OFFICE
 Current Phone # 314-567-7077
 Occupation Hydrologic tech
 Age N/A

PERSONAL USE - Characterize the personal use of the water by the surveyed individual

How long have you lived near this body of water? 10 yrs - worked
 Do you or your family utilize Missouri River and Mississippi River for water activities? YES or NO
 If YES please check the activities and approximate number of times and the season you did Alton

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	10-20 x/yr (week)	All	All
Water Skiing	0		
Other	0		

If NO, reasons why WQ
 (General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other No boat for access

WITNESSED USE - Characterize the observed use of the water by the surveyed individual

at Alton above Melvin Price

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0	Summer All	All
Kayaking	0	Summer All	
Tubing	0	Summer All	
Rafting	0	All	
Boating	0	All	
Water Skiing	0	All	
Other	0		

If NO, reasons why

Safety, WQ
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

ANECTODAL USE - Characterize the anecdotal use of the water heard by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0		
Kayaking	0		
Tubing	0		
Rafting	0		
Boating	0		
Water Skiing	0		
Other	<u>Bank Fishing</u>	<u>Summer</u>	<u>Various</u>

If NO, reasons why

Safety, WQ
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

Signature of Assessor

Renée Martin

Signature of Interviewed Individual

Date

1/10/05

above Melvin Price he's witnessed all Activities. On the MO. R. near St. Charles, has not witnessed any recreational Activities.

The purpose of this survey is to aid in identifying current recreational uses of the Missouri River and Mississippi River.

Assessor Renee Martin Interviewed by _____ By Person By Phone
Date 11/10/05 Time 0945
Reason for the interviewee selection Hydrologic Techs.
Location: Missouri River Mississippi River
Description (GPS optional) Mo. River near St. Charles
Miss. River near Alton, Grafton, East Bridge.

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Willie Easterling
Current Address District USGS office
Current Phone # 314-567-7077
Occupation Hydrologic Technician
Age _____

PERSONAL USE - Characterize the personal use of the water by the surveyed individual

How long have you lived near this body of water? 3

Do you or your family utilize Missouri River and Mississippi River for water activities? YES or NO

If YES please check the activities and approximate number of times and the season you did. Alton

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	<u>0</u>	<u>-</u>	<u>-</u>
Kayaking	<u>0</u>	<u>-</u>	<u>-</u>
Tubing	<u>0</u>	<u>-</u>	<u>-</u>
Rafting	<u>0</u>	<u>-</u>	<u>-</u>
Boating	<u>3 yrs work</u>	<u>All</u>	<u>Various</u>
Water Skiing	<u>0</u>	<u>-</u>	<u>-</u>
Other			

If NO, reason why WQ

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

WITNESSED USE - Characterize the observed use of the water by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0	—	—
Kayaking	0	—	—
Tubing	0	—	—
Rafting	0	—	—
Boating	0	—	—
Water Skiing	0	—	—
Other			

If NO, reasons why

WQ
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

ANECDOTAL USE- Characterize the anecdotal use of the water heard by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0	—	—
Kayaking	0	—	—
Tubing	0	—	—
Rafting	0	—	—
Boating	0	—	—
Water Skiing	0	—	—
Other			

If NO, reasons why

WQ
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

Signature of Assessor

Dennis Mart

Signature of Interviewed Individual

Date

1/10/05

— Missouri R. Near St. Charles

RECREATIONAL USE SURVEY FORM
 Missouri River and Mississippi River

The purpose of this survey is to aid in identifying current recreational uses of the Missouri River and Mississippi River.

Assessor Renee Martin interviewed by By Person By Phone

Date 11/2/05 Time 1:20

Reason for the interviewee selection Survey clerk for MDC

Location Missouri River Mississippi River

Description (GPS optional) Miss. River below Lock & Dam 26, N. Riverfront boat launch, Jones Confluence Miss/Mo River

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Tina Elfers
 Current Address 7320 Westfield Crossing St. Charles, MO 6304
 Current Phone # 636-300-0255
 Occupation MFC Resource Technician (Retired)
 Age 50

PERSONAL USE - Characterize the personal use of the water by the surveyed individual

How long have you lived near this body of water? 13 months

Do you or your family utilize Missouri River and Mississippi River for water activities? YES or NO

If YES please check the activities and approximate number of times and the seasons you did

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	<u>0</u>	/	/
Kayaking	<u>0</u>		
Tubing	<u>0</u>		
Rafting	<u>0</u>		
Boating	<u>0</u>		
Water Skiing	<u>0</u>		
Other	<u>0</u>		

If NO, reasons why No boat, size
 (General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other

WITNESSED USE - Characterize the observed use of the water by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0	/	/
Kayaking	① 6 x (total time)	Summer	Various
Tubing	0	/	/
Rafting	0	/	/
Boating	0	/	/
Water Skiing	0	/	/
Other	Bank Fishing, ① kayakers take boat out here.		

If NO reasons why _____

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

ANECDOTAL USE- Characterize the anecdotal use of the water heard by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0	0	0
Kayaking	0	0	0
Tubing	0	0	0
Rafting	0	0	0
Boating	0	0	0
Water Skiing	0	0	0
Other	Fishing	Summer	high

If NO reasons why _____

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other _____

Signature of Assessor _____

[Signature]

Signature of Interviewed Individual _____

Date _____

4/12/05

N. Riverfront access - boat can only use it during high flow, boat ramp not accessible during low flow conditions.

Jones Confluence - No boat launch, bank fishermen, photo opportunity due to 2 rivers meet.

RECREATIONAL USE SURVEY FORM
Missouri River and Mississippi River

The purpose of this survey is to aid in identifying current recreational uses of the Missouri River and Mississippi River.

Assessor Trent Stober Interviewed by By Person By Phone

Date 6/22/05 Time _____

Reason for the interviewee selection Associated with MVS Barefoot Water Ski organization

Location Missouri River Mississippi River

Description (GPS optional) _____

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Dave Sommer

Current Address _____

Current Phone # 314-322-0885

Occupation Contractor

Age 43

PERSONAL USE - Characterize the personal use of the water by the surveyed individual

How long have you lived near this body of water? 43 yrs. - Using the Rivers nearly entire life

Do you or your family utilize Missouri River and Mississippi River for water activities? YES ☐ NO

If YES please check the activities and approximate number of times and the season you did

ACTIVITIES	NUMBER OF TIMES PER PERIOD	SEASON	FLOW CONDITION
Swimming	<u>0 / 0</u>		
Kayaking	<u>0 / 0</u>		
Fishing	<u>0 / 0</u>		
Boating	<u>0 / 0</u> <u>MS</u>	<u>MO</u>	<u>MS-Alton MS-Salis</u>
Water Skiing	<u>1/yr / 2-3/wk / 1/yr</u>	<u>Summer/Fall/Winter/Nov./Jan. 1</u>	<u>Various</u>
Other	<u>1/yr / 2-3/wk / 1/yr</u>	<u>Summer/Fall/Winter/Nov./Jan. 1</u>	<u>Various</u>

If NO, reasons why In frequently uses Mo River - Too high current, WG conditions - When Dave does use
(General Answer: - water Quantity, lack of depth, weather, safety, etc.) Mo River, it is associated
Other MS River Use - Mike frequently uses (water ski) MS River with trip to Hermann
upstream of the Alton Pool (near Dandene Island, Cuivre Slough & Two Branch Island) via boat, skis upstream of Hermann.
Does not use MS River below Alton Pool due to high currents barge & boat traffic.
He participates in Jan. 1 water ski (charity) event at Arch. This is the
only water skiing use that, this segment he uses this segment.
for which

WITNESSED USE - Characterize the observed use of the water by the surveyed individual

(St. Charles to the river) NO / MS (Alton Pool)

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming			
Kayaking			
Tubing	Frequently during trip /		
Rafting			
Boating	Frequently during trip / Frequent	Alton Pool	Various
Water Skiing	Frequently during trip / Frequent	Alton Pool	Various
Other			

If NO, reasons why WBCR near St. Louis is limited by high currents, lack of access, lack of sand bars
(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other He has observed water skiing & personally used MS River near Kaskaskia River
confluence (near Evansville & New Athens).

ANECDOTAL USE - Characterize the anecdotal use of the water heard by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming			
Kayaking			
Tubing			
Rafting			
Boating			
Water Skiing	MS River - Several times/yr. *See Note		
Other	near St. Louis		

If NO, reasons why

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other Dave has heard of two brothers that ski within the Chain of Rocks
Canals at Granite City.

Signature of Assessor

[Signature]

Signature of Interviewed Individual

Date

7/7/05

RECREATIONAL USE SURVEY FORM
Missouri River and Mississippi River

The purpose of this survey is to aid in identifying current recreational uses of the Missouri River and Mississippi River.

Assessor Trent Stober Interviewed by By Person By Phone
Date 6/22/05 Time _____
Reason for the interviewee selection Representative of MVS Barefoot water ski organization
Location Missouri River Mississippi River
Description (GPS optional) _____

- UNSUPERVISED CHILDREN SHALL NOT BE INTERVIEWED -

CONTACT INFORMATION

Legal Name Doug Winters
Current Address _____
Current Phone # 636-236-4882
Occupation Boat Sales
Age 30

PERSONAL USE - Characterize the personal use of the water by the surveyed individual

How long have you lived near this body of water? 7-8 years - Used rivers during this period

Do you or your family utilize Missouri River and Mississippi River for water activities? YES or NO

If YES please check the activities and approximate number of time and the season you did:

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	<u>0/0</u>		
Kayaking	<u>0/0</u>		
Tubing	<u>0/0</u>		
Rafting	<u>0/0</u>		
Boating	<u>10/4-5d/wk/1/yr</u>	<u>Mar - Nov</u>	<u>Various</u>
Water Skiing	<u>0/4-5d/wk/1/yr</u>	<u>Mar - Nov</u>	<u>Various</u>
Other			

If NO, reason why _____

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other Frequently uses Alton Pool (Cairne Slough, Iowa & Turkey Islands), provides water ski lessons for approximately 200 children during summers. Participates in "Arch Ski" on Jan. 1, a charity event for handicapped children.

WITNESSED USE - Characterize the observed use of the water by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming	0 / 0		
Kayaking	1-2/yr / 1-2/yr	Summer	
Tubing	0 / 0		
Rafting	0 / 0		
Boating	Infrequent on Alton Pool		
Water Skiing	0	Infrequent on Alton Pool / Once in St. Louis Mar/Nov/Summer	Various
Other			

If NO, reasons why: Only observes infrequent water skiing at Alton Pool due to his presence only on weekdays.

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other: Lake St. Louis Water Ski Club performed a ski pyramid once for a nationally distributed water ski magazine. Kayaking observations - Mo - Near Blanchette, MS - Alton Pool

ANECDOTAL USE- Characterize the anecdotal use of the water heard by the surveyed individual

ACTIVITIES	NUMBER OF TIMES/PER PERIOD	SEASON	FLOW CONDITION
Swimming			
Kayaking			
Tubing			
Rafting			
Boating			
Water Skiing	None heard of below Alton Pool		
Other			

If NO, reasons why: _____

(General Aesthetics, Water Quality, Lack of Depth, Weather, Safety, Velocity)

Other: _____

Signature of Assessor [Signature]

Signature of Interviewed Individual _____

Date 6/22/05

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

Appendix E Barge Traffic Data

Mississippi River Monthly Barge Traffic Summary for Melvin Price Locks and Dam and Locks and Dam 27

Month-Year	Locks 27 Total Upbound Vessels	Locks 27 Total Downbound Vessels	Lock Melvin Price Total Upbound Vessels	Lock Melvin Price Total Downbound Vessels	Lock 27 Total Upbound Barges	Lock 27 Total Downbound Barges	Lock Melvin Price Total Upbound Barges	Lock Melvin Price Total Downbound Barges	Total Vessels Passing St. Louis Area	Total Barges Passing St. Louis Area
Jan-95	310	335	217	250	2,529	3,002	2,150	2,701	645	5,531
Feb-95	307	297	215	210	2,733	2,390	2,466	2,143	604	5,123
Mar-95	413	376	331	276	4,106	3,001	3,747	2,686	789	7,107
Apr-95	492	448	524	501	4,322	3,714	3,995	3,449	1,025	8,036
May-95	289	287	316	334	2,287	2,321	2,224	2,430	650	4,717
Jun-95	472	401	471	371	3,513	3,107	3,305	2,790	873	6,620
Jul-95	610	645	1,150	1,124	3,995	4,007	3,758	3,745	2,274	8,002
Aug-95	475	517	1,093	1,105	3,789	3,996	3,608	3,750	2,198	7,785
Sep-95	444	512	874	957	3,192	3,625	2,933	3,397	1,831	6,817
Oct-95	474	738	628	937	4,429	3,897	4,106	3,617	1,565	8,326
Nov-95	441	574	400	539	3,896	4,982	3,581	4,703	1,015	8,878
Dec-95	411	437	317	377	3,458	3,883	3,102	3,534	848	7,341
Average	428	464	545	582	3,521	3,494	3,248	3,245	1,126	7,015
Jan-96	226	239	190	205	2,003	2,370	1,820	2,183	465	4,373
Feb-96	248	239	217	220	1,760	1,879	1,601	1,789	487	3,639
Mar-96	445	408	411	379	4,657	3,468	4,377	3,082	853	8,125
Apr-96	463	402	530	477	4,571	3,769	4,365	3,599	1,007	8,340
May-96	437	419	514	471	4,007	3,528	3,763	3,340	985	7,535
Jun-96	442	438	598	542	3,600	3,686	3,470	3,490	1,140	7,286
Jul-96	676	806	997	1,062	3,491	4,190	3,192	3,933	2,059	7,681
Aug-96	404	492	636	664	2,514	2,862	2,332	2,661	1,300	5,376
Sep-96	396	509	592	729	2,630	2,066	2,442	1,862	1,321	4,696
Oct-96	463	585	465	682	4,187	3,857	3,898	3,617	1,147	8,044
Nov-96	429	475	377	467	3,495	4,683	3,211	4,385	904	8,178
Dec-96	378	433	300	336	3,047	3,666	2,784	3,380	811	6,713
Average	417	454	486	520	3,330	3,335	3,105	3,110	1,005	6,666
Jan-97	242	246	185	191	1,767	1,923	1,420	1,633	488	3,690
Feb-97	313	314	254	257	2,847	2,532	2,540	2,180	627	5,379
Mar-97	387	381	343	341	3,674	3,180	3,321	2,924	768	6,854
Apr-97	362	335	379	360	2,905	2,571	2,694	2,336	739	5,476
May-97	448	393	510	436	3,548	3,250	3,268	3,020	946	6,798
Jun-97	456	444	578	530	3,383	3,364	3,221	3,095	1,108	6,747
Jul-97	619	701	814	854	3,344	3,452	3,121	3,243	1,668	6,796
Aug-97	356	363	497	578	2,957	2,983	2,817	2,961	1,075	5,940
Sep-97	286	354	473	586	2,950	2,404	2,779	2,329	1,059	5,354
Oct-97	445	643	468	669	3,915	4,339	3,719	3,962	1,137	8,254
Nov-97	351	456	316	455	3,006	4,132	2,768	3,893	807	7,138
Dec-97	315	345	248	299	2,792	3,029	2,512	2,659	660	5,821
Average	382	415	422	463	3,091	3,097	2,848	2,853	885	6,187
Jan-98	237	264	183	204	1,992	2,293	1,696	1,921	501	4,285
Feb-98	288	274	202	198	2,392	2,177	2,039	1,865	562	4,569
Mar-98	383	358	321	301	3,795	3,017	3,463	2,671	741	6,812
Apr-98	355	316	343	310	2,887	2,490	2,661	2,263	671	5,377
May-98	428	411	419	369	3,429	3,375	3,122	3,032	839	6,804
Jun-98	486	463	438	413	3,553	3,301	3,368	3,093	949	6,854
Jul-98	632	727	610	621	3,910	3,611	3,648	3,340	1,359	7,521
Aug-98	443	480	464	505	3,417	3,474	3,264	3,267	969	6,891
Sep-98	372	465	394	545	2,710	2,604	2,499	2,370	939	5,314
Oct-98	391	565	361	541	3,009	3,383	2,753	3,192	956	6,392
Nov-98	394	476	335	411	3,401	4,273	3,166	3,984	870	7,674
Dec-98	334	371	299	329	3,122	3,465	2,892	3,201	705	6,587
Average	395	431	364	396	3,135	3,122	2,881	2,850	826	6,257
Jan-99	246	227	174	171	1,587	1,516	1,264	1,288	473	3,103
Feb-99	266	290	201	222	2,414	2,707	2,204	2,459	556	5,121
Mar-99	406	366	338	276	4,059	2,855	3,785	2,593	772	6,914
Apr-99	402	347	363	338	3,967	3,235	3,789	3,214	749	7,202
May-99	535	445	530	449	4,135	3,840	3,971	3,617	984	7,975
Jun-99	492	476	506	445	3,834	3,933	3,645	3,681	982	7,767
Jul-99	600	683	674	663	4,263	3,896	4,023	3,775	1,357	8,159
Aug-99	458	541	395	503	3,525	3,966	3,292	3,733	999	7,491
Sep-99	433	605	421	615	3,219	3,139	2,986	2,954	1,048	6,358
Oct-99	392	583	394	635	3,392	3,740	3,182	3,500	1,029	7,132
Nov-99	379	442	373	456	3,084	4,024	2,810	3,747	835	7,108
Dec-99	349	382	287	330	3,131	3,577	2,804	3,287	731	6,708
Average	413	449	388	425	3,384	3,369	3,146	3,154	862	6,753

MEC Water Resources, Inc.

Mississippi River

Whole Body Contact Recreation Use Attainability Analysis

Mississippi River Annual Barge Traffic Summary for Melvin Price Locks and Dam and Locks and Dam No. 27

Year	Lock 27 Total Upbound Vessels	Lock 27 Total Downbound Vessels	Lock Melvin Price Total Upbound Vessels	Lock Melvin Price Total Downbound Vessels	Lock 27 Total Upbound Barges	Lock 27 Total Downbound Barges	Lock Melvin Price Total Upbound Barges	Lock Melvin Price Total Downbound Barges	Total Vessels Passing St. Louis Area	Total Barges Passing St. Louis Area
1995	5,138	5,567	6,536	6,981	42,249	41,925	38,975	38,945	13,517	84,174
1996	5,007	5,445	5,827	6,234	39,962	40,024	37,255	37,321	12,061	79,986
1997	4,580	4,975	5,065	5,556	37,088	37,159	34,180	34,235	10,621	74,247
1998	4,743	5,170	4,369	4,747	37,617	37,463	34,571	34,199	9,913	75,080
1999	4,958	5,387	4,656	5,103	40,610	40,428	37,755	37,848	10,345	81,038
2000	4,645	5,092	4,280	4,785	38,973	39,101	36,389	36,463	9,737	78,074
2001	4,789	5,148	4,622	5,035	37,752	37,634	35,080	35,115	9,937	75,386